



**OHM Remediation
Services Corp.**
A Subsidiary of OHM Corporation

**SITE-SPECIFIC HEALTH AND SAFETY PLAN
FOR REMEDIATION OF SITES 1, 3, 5, 6, AND 8
BRUNSWICK NAVAL AIR STATION
BRUNSWICK, MAINE**

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Delivery Order 0040

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May 12, 1995
OHM Project 16285

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed for the Department of the Navy, LANTDIV, Delivery Order 0040, entitled "Sites 1, 3, 5, 6 and 8, Brunswick Naval Air Station, Brunswick Maine." The Delivery Order will be executed per the requirements stated in the Final Statement of Work (SOW) per Contract No. N62470-93-D-3032, in cooperation with the Navy. This Delivery Order will also be executed in accordance with Naval Facilities Engineering Command (NAVFAC).

This HASP documents the policies and procedures which protect workers and the public from potential hazards posed by work at this site. OHM considers safety the highest priority during work at a site containing potentially hazardous materials and has established a goal of zero accidents for all projects. All projects will be conducted in a manner which minimizes the probability of injury, accident, or incident occurrence. This HASP is a key element in the proper planning of project work which is necessary to assure the goal of zero accidents. The HASP Acknowledgment (Appendix A) will be signed by all who actively participate at this project.

Although the plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require deviations from the original plan. This flexibility allows modification by the OHM supervisors and health and safety officials with approval from the project CIH.

1.1 SITE HISTORY

Sites 1 and 3 are former landfills which are contaminated as a result of landfilling garbage, food waste, refuse, waste oil, solvents, pesticides, petroleum products, paint wastes, isopropyl alcohol, aircraft and automobile parts, and various chemicals. Refer to Figure 1-1 for a map which shows the site locations. Refer to Figure 1-2 for a drawing showing the Sites 1 and 3 work zones.

Site 5 was used to dispose of asbestos-lined pipe from a building that was demolished on-base. The site was inspected in 1980 by a facility engineer who described the site as consisting of two trenches filled with the asbestos material and covered with soil. Refer to Figure 1-3 for a drawing showing the Site 5 work zones.

Site 6 was reportedly used for general dumping of construction debris and other nonputrescible wastes. Aircraft parts and asbestos-containing pipes were reportedly burned here. Concrete, asphalt, pipes, and other debris are visible at the site surface. Refer to Figure 1-4 for a drawing showing the Site 6 work zones.

Site 8 was a disposal area for rubble, debris, and trash from the base. In addition, industrial solvents may have been disposed here. Refer to Figure 1-5 for a drawing showing the Site 8 work zones.



1.2 SCOPE OF WORK

These activities have been analyzed for potential hazards for which hazard control measures are provided in Section 3.4 - Activity Hazard Analysis:

- Removal of wastes from separate landfill Sites 5, 6, and 8 and placing it in Sites 1 and 3
- Installation of slurry wall around landfill Sites 1 and 3
- Backfilling of clean fill to develop the landfill grade at Sites 1 and 3
- Installation of a layered geosynthetic and soil cap.

2.0 KEY PERSONNEL AND MANAGEMENT

The Project Manager (PM), Site Supervisor (SS), Certified Industrial Hygienist (CIH) and Site Safety Officer (SSO) are responsible for formulating and enforcing health and safety requirements, and implementing the HASP. Reporting relationships are shown in Figure 2.1

2.1 PROJECT MANAGER

The PM has the overall responsibility for the project and to assure that the goals of the construction remedial action are attained in a manner consistent with the HASP requirements. The PM will coordinate with the SS and the SSO to assure that the remedial action goals are completed in a manner consistent with the HASP. The PM will conduct a monthly health and safety audit of the project using the Management Health and Safety Report Form. The PM reports to the Program Manager.

2.2 SITE SUPERVISOR

The SS is responsible for field implementation of the HASP. The SS will be the main contact in any on-site emergency situation. The SS will conduct periodic inspection of the work site to confirm compliance with all health and safety requirements. The SS is also responsible for coordinating remedial actions for all deficiencies and for enforcing the OHM "Cardinal Safety Rules." The SS reports to the Project Manager.

2.3 SITE SAFETY OFFICER

The SSO has responsibility for administering the HASP relative to site activities, and will be in the field periodically to monitor site activities. The SSO's primary operational responsibilities include personal and environmental monitoring, coordination of job safety analyses, personal protective equipment maintenance, and assignment of protection levels. The SSO will direct all field activities involved with safety and is authorized to stop work when an imminent health or safety risk exists. The SSO is responsible for assuring that all on-site personnel understand all safety requirements. The SSO reports jointly to the CIH and the Project Manager.

2.4 CERTIFIED INDUSTRIAL HYGIENIST

The CIH is responsible for the contents of the HASP and will ensure that the HASP complies with all federal, state and local health and safety requirements. If necessary, the CIH can modify specific aspect of the HASP to adjust for on-site changes that affect safety. The CIH will coordinate with the SSO on all modifications to the HASP and will be available for consultation when required. The CIH will not necessarily be on site during OHM activities. The CIH reports to the Regional Vice President/General Manager and the Program Manager.

2.5 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for personal safety as well as the safety of others in the area. The employee will use all equipment provided in a safe and responsible manner as directed by the SS. All OHM personnel will follow the policies set forth in the OHM Health and Safety Procedures Manual, with

particular emphasis on the OHM "Cardinal Safety Rules." A copy of this manual will be kept on site for reference.

2.6 KEY SAFETY PERSONNEL

The following individuals share responsibility for health and safety at the site:

- Project Manager Joseph Colella, P.E.
412-963-2300 (office)
- Site Supervisor Tom Sharpless
207-729-8399/8389 (site phone)
- Site Safety Officer TBD
(site phone)
- Program Manager for LANTDIV George Krauter, P.E.
609-588-6477 (office)
- ER Health and Safety Director/Project CIH Kevin McMahon, M.S., CIH
609-588-6375 (office)
609-421-7523 (pager)
- Vice President, Health and Safety Fred Halvorsen, Ph.D., P.E., CIH
800-231-7031

3.0 JOB HAZARD ANALYSIS

This section outlines the potential chemical and physical hazards which workers may be exposed to during work on this project. Section 3.1 lists significant contaminants identified at the site. An MSDS list is included in Appendix C.

3.1 CHEMICAL HAZARDS

3.1 CHEMICAL HAZARDS			
CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Arsenic	Inhalation, ingestion	10 $\mu\text{g}/\text{m}^3$	Carcinogen; ulceration of nasal septum; dermatitis; GI disturbances; peripheral neuropathy; respiratory irritation
Vinyl Chloride	Inhalation, skin, ingestion, eyes	1.0 ppm	Carcinogen; weakness; abdominal pain; GI bleeding; hepatomegaly; pallor or cyanosis of extremities
Methyl Chloride	Inhalation, skin, ingestion, eyes	100 ppm	Carcinogen; dizziness, nausea, vomiting; visual disturbance; staggered walking; slurred speech; convulsions; coma; liver, kidney damage
1,2-Dichloro-ethylene	Inhalation, skin, ingestion, eyes	200 ppm	Irritation of eyes and respiratory system; central nervous system depression
Chromium	Inhalation, ingestion	1.0 mg/m^3	Histologic fibrosis of lungs
Lead	Inhalation, ingestion	0.05 mg/m^3	Weakness; anemia; insomnia; anorexia; abdominal pain; GI disorders; nerve damage
1,1,1-Trichloro-ethane (methyl chloroform)	Inhalation, skin, ingestion, eyes	350 ppm	Headache; lassitude; CNS depression; poor equilibrium; eye irritation; dermatitis; cardiac arrhythmia
Tetra-chloroethylene	Inhalation, skin, ingestion, eyes	100 ppm	Carcinogen; irritation of eyes, nose, throat; nausea; flush face, neck; dizziness; lack of coordination; headache; drowsiness; vertigo; liver damage
Asbestos	Inhalation, ingestion	0.1 fibers/cc	Carcinogen; dyspnea; interstitial fibrosis; restricted pulmonary function; finger clubbing

The following general symptoms may indicate exposure to a hazardous material. Personnel will be removed from the work site and provided proper medical attention immediately if the following symptoms occur:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns.

3.2 PHYSICAL HAZARDS

To minimize physical hazards, OHM has developed standard safety protocols which will be followed at all times. Failure to follow safety protocols will result in expulsion of an employee from the site and appropriate disciplinary actions.

The SS and SSO will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. Hard hats, safety glasses, and steel-toed safety boots are required in all areas of the site. Site-specific hazards and all necessary precautions will be discussed at the daily safety meetings. The Health and Safety Procedures Manual for LANTDIV will be maintained at the project site as a reference document.

3.3 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants pose a hazard when performing outdoor work. The SSO and SS will take all necessary measures to alleviate these hazards should they arise.

3.3.1 Heat Stress

The combination of warm ambient temperature and protective clothing result in the potential for heat stress. Heat stress disorders include:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke.

Heat stress prevention is outlined in Procedure No. 22 of the OHM Corp. LANTDIV Health and Safety Procedures manual. This information will be reviewed during safety meetings. Workers will be encouraged to increase consumption of water and electrolyte-containing beverages, e.g., Gatorade.

It is recommended that workers break approximately every 2 hours for 10- to 15-minute rest periods when temperatures rise above 72.5 degrees Fahrenheit and protective clothing is worn. In addition, workers are encouraged to take rests whenever they feel any adverse effects that may be heat-

related. The frequency of breaks may need to be increased upon worker recommendation to the SSO and SS. Heat stress can be prevented by assuring an adequate work/rest schedule; guidelines are presented below.

<i>AMBIENT TEMPERATURE</i>	<i>NO CHEMICAL PROTECTIVE CLOTHING (LEVEL D PPE)</i>	<i>CHEMICAL PROTECTIVE CLOTHING (D+/C/B/A)</i>
90° F or above	After 45 minutes of work	After 15 minutes of work
87.5 F-90 F	After 60 minutes of work	After 30 minutes of work
82.5-87.5 F	After 90 minutes of work	After 60 minutes of work
77.5-82.5 F	After 120 minutes of work	After 90 minutes of work
72.5-77.5 F	After 150 minutes of work	After 120 minutes of work

The work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. The frequency of monitoring is provided herein.

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, increase the following rest period by 1/3. The initial rest period should be at least 10 minutes.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70 degrees Fahrenheit when wearing chemical protective clothing, or 80 degrees Fahrenheit for site activities performed with no chemical protective clothing (Level D). Monitoring will include pulse rate, weight loss, oral temperature and signs and symptoms of heat stress. See Procedure No. 22 LANTDIV Health and Safety Procedures Manual.

3.3.2 Biological Hazards

- Poison Ivy (Rhus Radicans)

Poison Ivy may be found at the site. It is highly recommended that all personnel entering into an area with poison ivy wear a minimum of a tyvek coverall, to avoid skin contact.

The majority of skin reactions following contact with offending plants are allergic in nature and characterized by:

- General symptoms of headache and fever
- Itching

- Redness
- A rash.

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may develop a high fever and feel very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed 24 to 48 hours.

Distinguishing Features of Poison Ivy Group Plants

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. Both plants have greenish-white flowers and berries that grow in clusters.

First Aid

- a. Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
 - b. Apply calamine or other soothing lotion if rash is mild.
 - c. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.
- Ticks

Heavily vegetated areas of a site may have ticks. It is highly recommended that all personnel walking through such areas wear a tyvek coverall and latex boot covers taped at all joints. The ticks will stand out against the light colors. A tick or insect repellent containing DEET is recommended.

Ticks can transmit several diseases, including Rocky Mountain spotted fever, a disease that occurs in the eastern portion of the United States as well as the western portion, and Lyme disease. Ticks adhere tenaciously to the skin or scalp. There is some evidence that the longer an infected tick remains attached, the greater is the chance that it will transmit disease.

First Aid

- a. Carefully (slowly and gently) remove the tick with tweezers, taking care that all parts are removed.
- b. With soap and water, thoroughly, but gently, scrub the area from which the tick has been removed, because disease germs may be present on the skin; also wipe the bite area with an antiseptic.

- c. If you have been bitten, place the tick in a jar labeled with the date, location of the bite, and the location acquired. If any symptom appears, such as an expanding red rash, contact a physician immediately.

- Lyme Disease

Lyme disease may cause a number of medical conditions, including arthritis, that can be treated if you recognize the symptoms early and see your doctor. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve and heart problems as well as a disabling type of arthritis.

You are more likely to spot early signs of Lyme disease rather than see the tick or its bite. This is because the tick is so small (about the size of the head of a common pin or a period on this page and a little larger after they fill with blood), you may miss it or signs of a bite. However, it is also easy to miss the early symptoms of Lyme disease.

In its early stage, Lyme disease may be a mild illness with symptoms like the flu. It can include a stiff neck, chills, fever, sore throat, headache, fatigue, and joint pain. But this flu-like illness is usually out of season, commonly happening between May and October when ticks bite.

Most people develop a large, expanding skin rash around the area of the bite. Some people may get more than one rash. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It's easy to miss the rash and the connection between the rash and the tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be another early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes from other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

In later stages, Lyme disease may be confused with other medical problems. These problems can develop months to years after the first tick bite.

Early treatment of Lyme disease symptoms with antibiotics can prevent the more serious medical problems of later stages. If you suspect that you have symptoms of Lyme disease, contact your doctor.

Lyme disease can cause problems with the nervous system that look like other diseases. These include symptoms of stiff neck, severe headache, and fatigue usually linked to meningitis. They may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease can also mimic symptoms of multiple sclerosis or other types of paralysis.

Lyme disease can also cause serious but reversible heart problems, such as irregular heart beat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Researchers think these more serious problems may be linked to how the body's defence or immune system responds to the infection.

3.3.3 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 dbA (TWA) as well as personnel working around heavy equipment. The SSO will determine the need for and appropriate testing procedures, i.e., sound level meter and/or dosimeter for noise measurement.

3.4 TASK-SPECIFIC RISK ASSESSMENT/ACTIVITY HAZARD ANALYSIS

3.4.1 ACTIVITY HAZARD ANALYSIS FOR EXCAVATION/INSTALLATION OF SLURRY WALL		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Excavation of Soil (> 5 feet)	Underground Utilities	<ul style="list-style-type: none">● Identify all underground utilities around the excavation site before work commences● Cease work immediately if unknown utility markers are uncovered
	Struck By/Against Heavy Equipment	<ul style="list-style-type: none">● Use reflective warning vests when exposed to vehicular traffic● Avoid equipment swing areas● Make eye contact with operators before approaching equipment● Understand and review hand signals
	Sharp Objects	<ul style="list-style-type: none">● Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects● Maintain all hand and power tools in a safe condition● Keep guards in place during use
	High Noise Level	<ul style="list-style-type: none">● Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)

3.4.1 ACTIVITY HAZARD ANALYSIS FOR EXCAVATION/INSTALLATION OF SLURRY WALL		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Excavation of Soil (Continued)	Excavation Wall Collapse	<ul style="list-style-type: none"> • Construction diversion ditches or dikes to prevent surface water from entering excavation • Provide good drainage of area adjacent to excavation to minimize the collection of rainwater in the excavation • Store excavated material at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face • Prohibit unauthorized entry of excavation • Provide sufficient stairs, ladders, or ramps when workers enter excavations over 4 feet in depth • Place ladders no more than 25 feet apart laterally • Treat excavations over 4 feet deep as confined spaces • Complete confined space permit entry procedure • Monitor atmosphere for flammable/toxic vapors, and oxygen deficiency • Slope, bench, shore, or sheet excavations over 5 feet deep if worker entry is required • Assign a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting • Inspect excavations (when personnel entry is required) daily, any time conditions change • Provide at least two means of exit for personnel working in excavations
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment, vegetation, excavated material, tools, and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads

3.4.1 ACTIVITY HAZARD ANALYSIS FOR EXCAVATION/INSTALLATION OF SLURRY WALL		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Excavation of Soil (Continued)	High/Low Ambient Temperature	<ul style="list-style-type: none">• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual
	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none">• Provide workers proper skin, eye, and respiratory protection based on the exposure hazards present• Review hazardous properties of site contaminants with workers before operations begin• Dampen soil using light water spray to prevent fugitive dust emissions

3.4.2 ACTIVITY HAZARD ANALYSIS FOR SOIL/WASTE EXCAVATION

TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Excavation of Soil/Waste	Underground Utilities	<ul style="list-style-type: none"> • Identify all underground utilities around the excavation site before work commences • Cease work immediately if unknown utility markers are uncovered
	Struck By/Against Heavy Equipment	<ul style="list-style-type: none"> • Use reflective warning vests when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals
	Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Level	<ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment, vegetation, excavated material, tools, and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads

3.4.2 ACTIVITY HAZARD ANALYSIS FOR SOIL/WASTE EXCAVATION

TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Excavation of Waste (Continued)	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none">• Provide workers proper skin, eye, and respiratory protection based on the exposure hazards present• Review contaminant chemical MSDSs with workers before operations begin
	High/Low Ambient Temperature	<ul style="list-style-type: none">• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

3.4.3 ACTIVITY HAZARD ANALYSIS FOR BACKFILLING SOIL		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Backfilling with Soil	Slips, Trips, Falls	<ul style="list-style-type: none">• Clear walkways, work areas of equipment, vegetation, excavated material, tools, and debris• Mark, identify, or barricade other obstructions
	Struck By/Against Heavy Equipment	<ul style="list-style-type: none">• Use reflective warning vests when exposed to vehicular traffic• Avoid equipment swing areas• Make eye contact with operators before approaching equipment• Understand and review hand signals
	Sharp Objects	<ul style="list-style-type: none">• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects• Maintain all hand and power tools in a safe condition• Keep guards in place during use

4.0 WORK AND SUPPORT AREAS

To prevent migration of contamination caused through tracking by personnel or equipment, work areas and personal protective equipment will be clearly specified prior to beginning operations. OHM has designated work areas or zones as suggested by the NIOSH/OSHA/USCG/EPA'S document titled, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities." Each work area will be divided into three zones as follows:

- Exclusion or "Hot" Zone (EZ)
- Contamination Reduction Zone (CRZ)
- Support Zone (SZ).

4.1 EXCLUSION ZONE

The EZ is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks and monitoring performed within that zone. The EZ for this project is identified in Figure 1.1 (Site Map).

4.2 CONTAMINATION REDUCTION ZONE

The CRZ or transition zone will be established between the EZ and SZ. In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ. The CRZ for this project is identified in Figure 1.1.

4.3 SUPPORT ZONE

The SZ serves as a clean, control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment, or clothing will not be allowed in the SZ. The support facilities should be located upwind of site activities. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the SSO and the SS to ensure proper safety protocols are followed. The SZ is identified in Figure 1.1.

4.4 SITE CONTROL LOG

A log of all personnel visiting, entering or working on the site shall be maintained in the main office trailer location. The log will record the date, name, company or agency, and time entering or exiting the site.

No visitor will be allowed in the EZ without showing proof of training and medical certification. Visitors will supply their own boots and respiratory equipment, if required. Visitors will attend a site orientation given by the SSO and sign the HASP.

4.5 GENERAL

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contamination is prohibited in the EZ and CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking or other activities which may result in ingestion of contamination.
- A buddy system will be used. Hand signals will be established to maintain communication.
- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance. All personnel will be aware of dangerous situations that may develop.
- Visual contact will be maintained between buddies on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SSO or the SS, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site.

5.0 PROTECTIVE EQUIPMENT

This section addresses the various levels of personal protective equipment (PPE) which are or may be required at this job site. OHM personnel are trained in the use of all PPE utilized.

5.1 ANTICIPATED PROTECTION LEVELS

TASK	PROTECTION LEVEL	COMMENTS/MODIFICATIONS
Site Preparation	D	
Installation of Slurry Wall	C/D	Hearing protection required over 85 dBA
Asbestos Removal and Bagging in Landfill Sites 5 and 6 and Placing it in Sites 1 and 3	C/D	
Removal of Wastes from Landfill Site 8 and Placing it in Sites 1 and 3	C/D	
Backfilling of Clean fill to Develop the Landfill Grade at Sites 1 and 3	C/D	
Cap Installation	C/D	
CRZ Workers	D	
SZ Workers	D	

5.2 PROTECTION LEVEL DESCRIPTIONS

This section lists the minimum requirements for each protection level. Modification to these requirements will be noted above.

5.2.1 Level D

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather.

5.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, latex or PVC overboots
- Outer nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)
- Tyvek coverall (Polyethylene-coated Tyveks required when workers have a potential to be exposed to contaminated liquids or sludges).

5.2.3 Level C

Level C consists of the following:

- Full-face, air-purifying respirator with appropriate cartridges
- Hooded Tyvek Coveralls (Polyethylene-coated Tyveks required when workers have a potential to be exposed to contaminated liquids or sludges)
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, latex or PVC overboots
- Nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard).

5.2.4 Level B

Level B protection consists of the items required for Level C protection with the exception that an air-supplied respirator is used in place of the air-purifying respirator.

5.2.5 Level A

It is not anticipated that Level A will be used on this site.

5.3 SUPPLIED-AIR RESPIRATORS

If air monitoring shows that Level B protection is needed, OHM personnel will wear Survivair 9881-02 Hippack Airline respirators with 5-minute egress bottles. Personnel requiring Level "B" protection and high mobility will wear Survivair Mark 2 SCBA units.

5.4 BREATHING-AIR QUALITY

Code of Federal Regulations 29 CFR 1910.134 states breathing air will meet the requirement of the specification for Grade D breathing air as described in the ANSI/CGA Specification G-7.1-1989. OHM requires a certificate of analysis from vendors of breathing air in order to show that the air meets this standard. Breathing air will be obtained in cylinders exclusively and will be stationed in the EZ.

5.5 AIR-PURIFYING RESPIRATORS

A NIOSH approved full face respirator with appropriate air purifying cartridges will be used for Level C work.

5.6 RESPIRATOR CARTRIDGES

The crew members working in Level C will wear respirators equipped with air-purifying cartridges approved for the following contaminants.

- Organic vapors < 1,000 ppm
- Chlorine gas < 10 ppm
- Hydrogen chloride < 50 ppm
- Sulfur dioxide < 50 ppm
- Dusts, fumes and mists with a TWA < 0.05 mg/m³
- Asbestos-containing dusts and mists
- Radionuclides.

5.7 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once weekly, or more frequently if personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property. Cartridges will be labeled with the date service began.

5.8 INSPECTION AND CLEANING

Respirators are checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after each use.

5.9 FIT TESTING

Annual respirator fit tests are required of all personnel wearing negative-pressure respirators. The test will use isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used.

5.10 FACIAL HAIR

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

5.11 CORRECTIVE LENSES

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

5.12 CONTACT LENSES

Contact lenses will not be worn with any type of respirator.

5.13 MEDICAL CERTIFICATION

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

5.14 SITE-SPECIFIC RESPIRATORY PROTECTION PROGRAM

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need have been evaluated based on the site contaminants and expected levels of protection are outlined in Section 5.1. Air monitoring will be conducted to confirm that respiratory protection levels are adequate (Section 7.0). All respirator users are OSHA trained in proper respirator use and maintenance. The SS and SSO will observe workers during respirator use for signs of stress. The SS, CIH, and SSO will also evaluate this HASP periodically to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

6.0 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

6.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

1. Go to end of EZ
2. Wash outer boots and gloves in detergent solution
3. Rinse outer boots and gloves in water
4. Remove outer boots and let dry
5. Remove outer gloves and let dry
6. Cross into CRZ
7. Wash splash suit
8. Rinse splash suit
9. Remove splash suit and let dry
10. Remove booties and discard
11. Remove sample gloves and discard
12. Remove Saranex Tyvek suit and discard
13. Remove sample gloves and discard
14. Remove and wash respirator
15. Rinse respirator and hang to dry
16. Remove sample gloves and discard
17. Remove Tyvek and discard
18. Remove booties and discard
19. Remove sample gloves and discard.

6.1.1 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided as determined by the degree of injury.

6.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

6.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the SSO.

6.3 DISPOSAL

All decontamination liquids and disposable clothing will be treated as contaminated waste unless determined otherwise by accepted testing methods. Wastes will be disposed of according to state and federal regulations.

7.0 AIR MONITORING

Air monitoring will be conducted to determine airborne contamination levels. By monitoring the airborne contaminant levels, OHM ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered. The following air monitoring efforts will be used at this site. Additional air monitoring may be conducted at the discretion of the SSO.

The following chart describes the air monitoring required and appropriate action levels.

Monitoring Device	Action Level	Action
LEL/O ₂	< 10% LEL	Continue
	> 10% LEL	Evacuate area, ventilate, upgrade to Level B if necessary, continue to monitor
	< 20.9% O ₂	Continue
	19.5% - 20.8% O ₂ or 21.0% - 23.0% O ₂	SS will determine cause of the oxygen deficiency/enrichment before work may continue
	< 19.5% O ₂	Exit areas; evaluate oxygen deficiency; upgrade to Level B; ventilate
PID	> 23.0% O ₂	Cease operations; exit area; evaluate situation
	1 < ppm unknowns	Level D
	1-5 ppm unknowns	Level C
	5-500 ppm unknowns	Level B
Mini-Ram (total dust)	> 500 ppm unknowns	Level A
	$\geq 1.0 \text{ mg/m}^3$ - $\leq 10.0 \text{ mg/m}^3$ $\text{mg/m}^3 > 10.0 \text{ mg/m}^3$	Level C Level B
Personal Sampling:		
Lead	> 5.0 mg/m ³	Level C
Asbestos	< 0.1 fibers/cc	Level C
Perimeter Monitoring:		
Asbestos	> 0.1 fibers/cc	Control dust at source
Total Suspended Particulates	> 1.0 mg/m ³	Control dust at source
Na(Tl) Scintillation Detector	2 X background	Stop work; Notify ROICC
Geiger-Mueller Counter	2 X background	Stop work; Notify ROICC

7.1 LOWER EXPLOSIVE LIMIT/OXYGEN (LEL/O₂) METER

Prior to entering a confined-space area or hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL/O₂ measurements will be taken.

7.2 PHOTOIONIZATION DETECTOR (PID)

A PID will be used to monitor total ionizable organic content of the ambient air. The PID is a direct reading instrument to aid in determining if respiratory protection needs to be upgraded and to define the EZ.

For known contaminants only, the SSO will multiply the TLV of the known compound by 25 to determine a protection level from PID data. This will be the limit for Level C protection for that compound. If PID readings exceed 25 times the TLV, Level B protection will be required. Also, regardless of the TLV, a PID reading of 1,000 ppm or more will indicate that the GMC-H cartridges may become overloaded and will necessitate Level B protection. (Note: PID readings do not always indicate the actual air concentration of a compound. Consult the manual, HNU, or the CIH for clarification.)

The SSO will take measurements before operations begin in an area to determine the amount of organic compounds naturally occurring in the air. This is referred to as a background level.

Levels of volatile organic compounds will be measured in the air at active work sites once every hour and at the SZ once every hour when levels are detected above background in the EZ. If levels exceed background at any time in the SZ, work in the EZ will cease and corrective actions will be taken, e.g., cover soil with polyethylene sheeting. Work will not resume until levels reach background in the SZ.

7.3 PORTABLE TOTAL DUST MONITOR

A Mini-ram will be used to monitor the general respirable dust levels on the site. The air sampling will be performed at designated locations at the site perimeter upwind and downwind of the active work areas in the EZ. Site conditions will determine the frequency and duration of dust monitoring during the excavation of contaminated soil. Mini-ram readings will trigger dust abatement actions and PPE upgrades.

7.3.1 Type and Operational Aspects

- Real-Time Aerosol Monitor (Mini-ram Model PDM-3)
 - Principal of Operation
 - Detection of light in the near infrared region back-scattered to a sensor (photovoltaic detector) by airborne particulate in a sensing volume

- The higher the dust concentration, the more back-scattering of light to the sensor, resulting in increased readings
- Device calibrated at the factory against an air sampling filter/gravimetric analysis reference method.

7.3.2 Calibration Methods/Frequencies

There is no calibration method or procedure for calibrating the Mini-ram monitor. However, it is recommended that the Mini-ram monitor be re-zeroed once a week. During the zero check, the sampled air passes through the purge air filter and dryer to effect a self-cleaning of the optical chamber.

7.3.3 Preventative Maintenance

Maintenance of the Mini-ram consists of replacement of filters and desiccant, battery replacement, and cleaning of the optical detection assembly.

7.4 INTEGRATED AIR MONITORING PROGRAM

The integrated air monitoring program is for personal air monitoring. Personal air monitoring will be performed on personnel who are working in Levels C and D protection that have the highest potential for exposure to hazardous substances or health hazards above permissible exposure limits.

7.4.1 Air Monitoring Frequency

Air monitoring shall be conducted at least twice daily (once during the beginning of daily activity and once during peak activity) and:

- When work begins on a new phase or portion of a site
- When contaminants other than those previously identified are being handled
- When different types of activities occur (e.g., drum opening as opposed to exploratory well drilling)
- When employees are handling leaking drums or are exposed to obvious contamination
- Upon determination by the site safety officer, monitoring can be conducted continuously, daily or hourly.

7.4.2 Principle of Operation

- An air sampling pump is calibrated to draw a specified air flow rate (liters per minute) for a designated period of time (usually 8 hours)

- Volume of air sampled is calculated as follows:

Flow rate (liter/minute) x sample time (minute) = sample volume (liters)

- Use a bubble meter to calibrate air sampling pump; pump is equipped with a rotameter that shows the flow rate during the sampling period
- Collection Media--Mixed Cellulose Ester Filter (MCEF)
- Connect collection media/holder to air sampling pump using Tygon tubing; this comprises the sampling train that must be assembled to calibrate the pump.

7.4.3 Calibration Methods/Frequencies

Flow rate calibration can be accomplished by using primary standard soap and the Gilibrator (or equivalent). The calibrator allows rapid flow rate determination with direct read-out on the built-in display.

Simply connect the sampler to the calibrator, press the ON push button, and then push the plunger to start a bubble up the flow cell. The flow rate is automatically calculated and shown on the display. Subsequent readings are averaged with the previous readings. It is recommended that calibration of the sampler be checked prior to the start of, and after, each sampling period.

7.4.4 Preventative Maintenance

The Gilian constant flow air sampler was designed to provide both mechanical and electronic reliability. The sampling pump should not require special maintenance or adjustments under normal conditions. However, as with all instruments, the sampling pump does require some basic care. Basic maintenance of the Gilian air sampler consists of filter replacement, installation and removal of battery packs, storage conditions, and electronic control assembly.

7.5 RADIATION SURVEY

Two survey instruments will be used to qualitatively measure the presence of radioactive materials and the presence of ionizing radiation: a thin window Geiger-Mueller (GM) detector and a gamma scintillator detector using sodium iodide. OHM will periodically scan all soil surfaces and excavation zones for radiation.

7.5.1 Geiger-Mueller Detector

The GM detector will be attached to a ratemeter and used to scan soil or other debris in areas of excavation for the presence of ionizing radiation. The GM detector is suitable to measure beta and gamma radiations that penetrate the soil and debris or are present on the surface of equipment. The instrument will also measure alpha radiation to a lesser degree, assuming the radiation is not shielded by the soil or debris. The alpha radiation must also penetrate the mylar film, used to contain the argon-methane gas inside of the GM detector. The GM detector has a limited application for alpha

contamination. It measures all radiations as a total; it is not capable of distinguishing the type of radiation that is striking the detector. The instrument measures radiation in units of counts per minute (cpm).

7.5.2 Gamma Scintillator

The gamma scintillator uses sodium iodide (NaI) to measure the total contribution of gamma radiation. The detector is attached to a ratemeter and is useful to survey large areas for a change in gamma radiation levels. The detector will be used to scan soil that is excavator for disposal and is also useful to walk over an area and record the change in count rate. Surveys are performed routinely as the excavation continues as to identify a change in the radiation levels in the event that a source of radiation is uncovered.

7.5.3 Calibration

All instruments will be calibrated with a radioactive source certified by the National Institute for Standards and Technology (NIST), using cesium 137 (¹³⁷Cs) or other suitable isotope. Each instrument will be checked at least each day to verify that the instrument is operating within acceptable parameters.

7.5.4 Action Levels

The instruments will be operated in a low background area and the response rate will be recorded. In most areas, the background for a correctly operating GM detector is 50 to 100 cpm. The background for a gamma scintillator (2x2 NaI) is approximately 8,000 to 10,000 cpm. At any time that an instrument indicates a radiation level that exceeds background by more than two times (2x background), work will halt, OHM employees will be directed to leave the area, and the ROICC will be notified.

7.6 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include all information identified in Procedure 12 of the ER Safety Procedures Manual. The Project CIH will periodically review this data

7.7 CALIBRATION REQUIREMENTS

The PID, LEL/O₂ meter and sampling pumps required with fixed-media air sampling will be calibrated daily prior to use. A separate log will be kept detailing date, time, span gas, or other standard, and name of person performing the calibration.

7.8 AIR MONITORING RESULTS

Air monitoring results will be posted for personnel inspection, and will be discussed during morning safety meetings.

8.0 EMERGENCY RESPONSE

8.1 PRE-EMERGENCY PLANNING

Prior to engaging in construction/remediation activities at the site, OHM will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition site personnel will receive training during the site orientation concerning proper emergency response procedures.

The following situations would warrant implementation of the Emergency Response Contingency Plan (ERCP):

Fire/Explosion	<ul style="list-style-type: none">• The potential for human injury exists.• Toxic fumes or vapors are released.• The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions.• The use of water and/or chemical fire suppressants could result in contaminated run-off.• An imminent danger of explosion exists.
Spill or Release of Hazardous Materials	<ul style="list-style-type: none">• The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.• The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health.
Spill or Release of High Temperature Liquid or Vapor	<ul style="list-style-type: none">• The spill can be contained on site, but the potential exists for ground-water contamination.• The spill cannot be contained on site, resulting in off-site soil contamination and/or ground-water or surface water pollution.• The spill quantity is greater than the reportable quantity limit for the material.
Natural Disaster	<ul style="list-style-type: none">• A rain storm exceeds the flash flood level.• The facility is in a projected tornado path or a tornado has damaged facility property.• Severe wind gusts are forecasted or have occurred and have caused damage to the facility.

Medical Emergency	<ul style="list-style-type: none">• Overexposure to hazardous materials.• Trauma injuries (broken bones, severe lacerations/bleeding, burns).• Eye/skin contact with hazardous materials.• Loss of consciousness.• Heat stress (Heat stroke).• Cold stress (Hypothermia).• Heart attack.• Respiratory failure.• Allergic reaction.
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The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.
- On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.
- It will be the responsibility of the emergency coordinator (EC) to brief the on-site response team on anticipated hazards at the site. The EC shall also be responsible for anticipating and requesting equipment that will be needed for response activities.
- Emergency response activities will be coordinated with the Local Emergency Planning Committee (LEPC) in compliance with SARA Title III requirements.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The primary communication device will be two-way radios. Air horns may be used to alert personnel of emergency conditions. A telephone will be located at the command post to summon assistance in an emergency.

Primary communication with local responders in the event of an emergency will be accomplished using commercial telephone lines.

8.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the SS and SSO, through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and activity hazard analyses) to recognize and identify all hazards that are found at the site. These may include:

Chemical Hazards	<ul style="list-style-type: none">• Materials at the site• Materials brought to the site
Physical Hazards	<ul style="list-style-type: none">• Fire/explosion• Slip/trip/fall• Electrocution• Confined space• IDLH atmospheres• Excessive noise
Mechanical Hazards	<ul style="list-style-type: none">• Heavy equipment• Stored energy system• Pinch points• Electrical equipment• Vehicle traffic
Environmental Hazards	<ul style="list-style-type: none">• Electrical Storms• High winds• Heavy Rain/Snow• Temperature Extremes (Heat/Cold Stress)• Poisonous Plants/Animals

Once a hazard has been recognized, the SS and/or the SSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Lock-out/tag-out
- PPE selection/use
- Written and approved permits for hot work, confined space
- Trenching/shoring procedure
- Air monitoring
- Following all OHM standard operating procedures
- Practice drills for fire, medical emergency, and hazardous substances spills.

8.3 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary EC for this site is the SS. In the event an emergency occurs and the EC is not on site, the SSO or the highest ranking employee on site will serve as the EC until he arrives. The EC will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The EC will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment. Immediately after being notified of an emergency incident, the EC or his designee will evaluate the situation to determine the appropriate action.

8.3.1 Responsibilities and Duties - OHM

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. OHM will follow procedures as directed by the fire department, LEPC, State and Federal Agencies as required. OHM will defer to the local Fire Department chief to assume the role of Incident Commander upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

8.3.2 On-Site Emergency Coordinator Duties

The on-site EC is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the EC. Specific duties are as follows:

- Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.
- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, where appropriate.
- Notify local Emergency Response Teams if their help is necessary to control the incident. Table 8-1 provides telephone numbers for emergency assistance.
- Direct on-site personnel to control the incident until, if necessary, outside help arrives.
- Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if appropriate. The Emergency Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.

- If fire or explosion is involved, notify Base Fire Department.
- Notify LANTDIV ROICC.
- Notify OHM PM.
- Have protected personnel, in appropriate PPE, on standby for rescue.

If the incident may threaten human health or the environment outside of the site, the EC should immediately determine whether evacuation of area outside of the site may be necessary and, if so, notify the Police Department and the Office of Emergency Management.

When required, notify the National Response Center. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800-424-8802.

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.
- Containers of waste are removed or isolated from the immediate site of the emergency.
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.
- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.
- Notify the USEPA Region I Emergency Response Office that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility. The USEPA Regional Administrator's telephone number is included in the Emergency Contacts.

- Record time, date, and details of the incident, and submit a written report to the USEPA Regional Administrator. Report is due to USEPA within 15 days of the incident.

8.4 SAFE DISTANCES AND PLACES OF REFUGE

The EC for all activities will be the SS. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the CRZ. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the EC or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by their foremen and to await further instruction.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The EC, or his designee will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 8-1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather.

In general, evacuation will be made to the crew trailers, unless the EC determines otherwise. It is the responsibility of the EC to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the EC.

8.5 EVACUATION ROUTES AND PROCEDURES

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the EC may deviate from the procedures to provide a more effective plan for bringing the situation under control. The EC is responsible for determining which situations require site evacuation.

8.5.1 Evacuation Signals and Routes

Two-way radio communication and an air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. Each crew supervisor will have a two way radio. A base station will be installed in the OHM office trailer to monitor for emergencies. Total site evacuation will be initiated only by the EC, however, in his absence, decision to preserve the health and safety of employees will take precedence. Evacuation routes will be posted in each outside work area. Signs inside buildings will be posted on walls or other structural element of a building. Periodic drills will be conducted to familiarize each employee with the proper routes and procedures.

8.5.2 Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the SZ will assemble at the entrance to the site for a head count and await further instruction from the EC.
- ALL persons in the EZ and CRZ will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader will endeavor to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the EC.
- Contract personnel and visitors will also be accounted for.

- The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- A final tally of persons will be made by the EC or designee. No attempt to find persons not accounted for will involve endangering lives of OHM or other employees by re-entry into emergency areas.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the SS. The security guard will aid in accounting for visitors, contractors, and truckers by reference to sign-in sheets available from the guard shack.
- Personnel will be assigned by the EC to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance is given by the EC. At his direction, a signal or other notification will be given for re-entry into the facility.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

8.6 EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 8-1 provide a quick reference guide to follow in the event of a major spill.

8.6.1 Notification Procedures

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site EC.

On-site EC will obtain information pertaining to the following:

- The material spilled or released
- Location of the release or spillage of hazardous material
- An estimate of quantity released and the rate at which it is being released
- The direction in which the spill, vapor or smoke release is heading
- Any injuries involved
- Fire and/or explosion or possibility of these events
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site EC to assess the magnitude and potential seriousness of the spill or release.

8.6.2 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 feet in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 feet in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be enforced. In general an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site EC will inform the proper agencies in the event this is necessary (refer to Table 8-1).

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), OHM's practice is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA. OHM also follows the same practice for any substances not listed in the Acts noted above but which can be classified as a hazardous waste under RCRA.

Clean up personnel will take the following measures:

- Make sure all unnecessary persons are removed from the hazard area.
- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.

- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
- Spray the spill area with foam, if available, if volatile emissions may occur.
- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.
- For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

8.6.3 Emergency Response Equipment

The following equipment will be staged in the SZ and throughout the site, as needed, to provide for safety and first-aid during emergency responses.

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Eyewash/safety shower
- Emergency signal horn
- Self contained breathing apparatus (two)
- Stretcher/backboard.

In addition to the equipment listed above, OHM maintains direct reading instrumentation that may be used in emergency situations to assess the degree of environmental hazard. This equipment will only be used by the SSO or other specially trained personnel. This equipment will be stored, charged and ready for immediate use in evaluating hazardous chemical concentrations. The equipment will be located at the OHM office trailer.

<i>EQUIPMENT NAME</i>	<i>APPLICATION</i>
Portable HNU Photoionization Meter	Measures selected inorganic and organic chemical concentrations
MSA Oxygen and Combustible Gas Meter	Measures oxygen and combustible gas levels

8.6.4 Personal Protective Equipment

A supply of two (minimum) SCBAs will be located in the SZ for use in emergency response to hazardous materials releases. They will be inspected at least monthly, according to OSHA requirements. In addition, all emergency response personnel will have respirators available for use with cartridge

selection determined by the SSO based on the results of direct reading instruments. Emergency response personnel will also be provided with protective clothing as warranted by the nature of the hazardous material and as directed by the SSO.

8.6.5 Emergency Spill Response Clean-Up Materials and Equipment

A sufficient supply of appropriate emergency response clean-up and personal protective equipment will be inventoried and inspected, visually, on a weekly basis.

The materials listed below will be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the SZ, in a supply trailer or storage area. Small amounts will be placed on pallets and located in the active work areas.

- Sand or clay to solidify/absorb liquid spills.
- Lime (calcium oxide), soda ash (sodium carbonate), or baking soda (sodium bicarbonate) for neutralizing acid (pH < 7) spills.
- Activated charcoal (carbon) to adsorb organic solvents (hydrocarbons) and to reduce flammable vapors.
- Citric acid for neutralizing caustic (pH > 7) spills.
- Vapor-suppressing foam, if required by the Client, for controlling the release of volatile organic compounds.
- Appropriate solvents, e.g., CITRIKLEEN, for decontamination of structures or equipment.

The following equipment will be kept on site and dedicated for spill cleanup:

- Plastic shovels for recovering corrosive and flammable materials
- Sausage-shaped absorbent booms for diking liquid spills, drains, or sewers
- Sorbent sheets (diapers) for absorbing liquid spills
- Overpack drums for containerizing leaking drums
- 55-gallon open-top drums for containerization of waste materials.

*NOTE: All contaminated soils, absorbent materials, solvents and other materials resulting from the clean-up of spilled or discharged substances will be properly stored, labelled, and disposed of off-site by OHM with the proper authorization from the Navy.

8.7 EMERGENCY CONTINGENCY PLAN

This section of the ERCP details the contingency measures OHM will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

8.8 MEDICAL EMERGENCY CONTINGENCY MEASURES

The procedures listed below will be used to respond to medical emergencies. The SSO will contact the local hospital and inform them of the site hazards and potential emergency situations. A minimum of two First-Aid/CPR trained personnel will be maintained on site.

8.8.1 Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site EC to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the emergency, if known.

The EC will notify the SSO. The following actions will then be taken depending on the severity of the incident:

- Life-Threatening Incident--If an apparent life-threatening condition exists, the crew supervisor will inform the EC by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. Any injury within the EZ will be evacuated by OHM personnel to a clean area for treatment by (EMS) personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.
- Non Life-Threatening Incident--If it is determined that no threat to life is present, the SSO will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

***NOTE:** The area surrounding an accident site must not be disturbed until the scene has been cleared by the SSO.

Any personnel requiring emergency medical attention will be evacuated from exclusion and CRZs if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel
- Alert emergency and off-site medical personnel to potential contamination, instruct them about specific decontamination procedures
- Send site personnel familiar with the incident and chemical safety information, e.g., MSDS, with the affected person.

All injuries, no matter how small, will be reported to the SSO or the SS. An accident/injury/illness report will be completely and properly filled out and submitted to the Regional Health and Safety Director/Project CIH, in accordance with OHM's reporting procedures.

A list of emergency telephone numbers is given in Table 8-1.

8.8.2 Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-site EC
- Workers in the affected areas
- Client Representative.

8.8.3 Directions To Hospital

Written directions to the hospital and a map will be posted in all trailers in the staging area. Directions to the hospital are as follows:

Directions to Hospital from Brunswick NAS - Go through Main Gate of Base, make a left at the first light onto Route 24 (Bath Road); go 2.3 miles, passing Bowdoin College on left, and make a left onto Maine Street; make the third right onto McKeen Street; follow blue/white "H" signs, make a left turn onto Barbeau Drive. Mid Coast Hospital is 300 yards on the right. The phone number is 207/729-0181.

The map to the hospital, which will be posed in all trailers in the Staging Area, is presented on Figure 8-1.

8.9 FIRE CONTINGENCY MEASURES

OHM personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the EC by radio and vacate the structure or area. The EC will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.
- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

8.9.1 Response

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify their supervisor who will then contact the EC by radio. The EC will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a small fire has been extinguished by a worker, the EC will be notified.

8.10 HAZARDOUS WEATHER CONTINGENCY MEASURES

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy Rains/Snow
- High Winds.

8.10.1 Response

- Excavation/soil stock piles will be covered with plastic liner.
- All equipment will be shut down and secured to prevent damage.
- Personnel will be moved to safe refuge, initially crew trailers. The EC will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

8.10.2 Notification

The EC will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- OHM employees and subcontractors
- Client Representative
- Local Civil Defense Organization.

8.11 SPILL/RELEASE CONTINGENCY MEASURES

In the event of release or spill of a hazardous material the following measures will be taken:

8.11.1 Response

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

First aid will be administered to injured/contaminated personnel. Unsuspecting persons/vehicles will be warned of the hazard. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve or temporarily sealing a hole with a plug.

Utilizing radio communications, the EC will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Air monitoring will be implemented by the EC and SSO to determine the potential impact on the surrounding community. Notification procedures will be followed to inform on-site personnel and off-site agencies. The EC will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth
- Digging a sump, installing a polyethylene liner and
- Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- Transferring the material from its original container to another container.

The EC will notify the LANTDIV ROICC, Ens. Price-Thurlow of the spill and steps taken to institute clean-up. Emergency response personnel will clean-up all spills following the spill clean-up plan developed by the EC. Supplies necessary to clean up a spill will be immediately available on-site. Such items may include, but are not limited to:

- Shovel, rake
- Clay absorbent
- Polyethylene liner
- Personal safety equipment
- Steel drums
- Pumps and miscellaneous hand tools.

The major supply of material and equipment will be located in the SZ. Smaller supplies will kept at active work locations. The EC will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the ROICC. If necessary, soil, water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean-up effort. The EC will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The EC will review the cause with the ROICC and obtain his concurrence with the remedial action plan.

9.0 TRAINING REQUIREMENTS

As a prerequisite to employment at OHM, all field employees are required to take a 40-hour training class and pass a written examination. This training covers all forms of personal protective equipment, toxicological effects of various chemicals, hazard communication, bloodborne pathogens, handling of unknown tanks and drums confined-space entry procedures, and electrical safety. This course is in full compliance with OSHA requirements in 29 CFR 1910.120. In addition, all employees receive annual 8-hour refresher training and three day on-site training under a trained experienced supervisor. Supervisory personnel receive an additional 8-hour training in handling hazardous waste operations.

As described in OHM's Asbestos Abatement Plan for Sites 5 and 6 (submitted under separate cover as part of the Work Plan), workers involved in the handling of asbestos will receive training in accordance with the requirements of 29 CFR 1926.58(k)(3).

All personnel entering the EZ will be trained in the provisions of this site safety plan and be required to sign the Site Safety Plan Acknowledgment in Appendix A.

Site-specific training, which will include potential site contaminants, site physical and environmental hazards, emergency response and evacuation procedures, and emergency telephone numbers will be held at the site location by the SS and SSO before any site work activities begin.

10.0 MEDICAL SURVEILLANCE PROGRAM

All OHM personnel participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of OHM's worker medical profile is shown in Table 10-1. This program was developed in conjunction with a consultant toxicologist and OHM's occupational health physician. Other medical consultants are retained when additional expertise is required.

The medical surveillance program meets the requirements of the OSHA Standard 29 CFR 1910.120(f).

10.1 EXAMINATION SCHEDULE

Employees are examined initially upon start of employment, annually thereafter, and may be examined upon termination of employment. Unscheduled medical examinations are conducted:

- At employee request after known or suspected exposure to toxic or hazardous materials
- At the discretion of the client, the CIH, SSO, or OHM occupational physician after known or suspected exposure to toxic or hazardous materials
- At the discretion of the OHM occupational physician.

All nonscheduled medical examinations will include, as a minimum, all items specified above for periodic surveillance examination, with the exception of the chest X-ray, which will be conducted at the discretion of the occupational physician performing the examination.

TABLES

TABLE 8-1**EMERGENCY TELEPHONE NUMBERS**

<u>Local Agencies - All services</u>	
Fire Department	207-921-3333
Police	207-921-2587
Ambulance	207-921-2222
<u>Medical</u>	
Mid Coast Hospital	207-720-0181
Regional Poison Control Center	800-552-6337
<u>State Agencies</u>	
Maine State Police	207-624-7000
<u>Federal Agencies</u>	
EPA Region I Emergency Response Office	617-860-4361 (24 hour)
Agency for Toxic Substances and Disease Registry	404-639-0615 (24 hour)
<u>Navy ROICC/NTR</u>	
LTJG Douglas LaMay	207-921-2315/2325
U.S. Coast Guard - Atlantic Strike Team	609-724-0008/0396
National Response Center	800-424-8802 800-424-8802
<u>OHM</u>	
Project Manager - J. W. Colella	412-963-2300
Director, Health and Safety - Kevin McMahon	609-588-6375
OHM Corporation (24 hour)	800-537-9540
Additional Phone #'s in Section 2.0 this HASP	

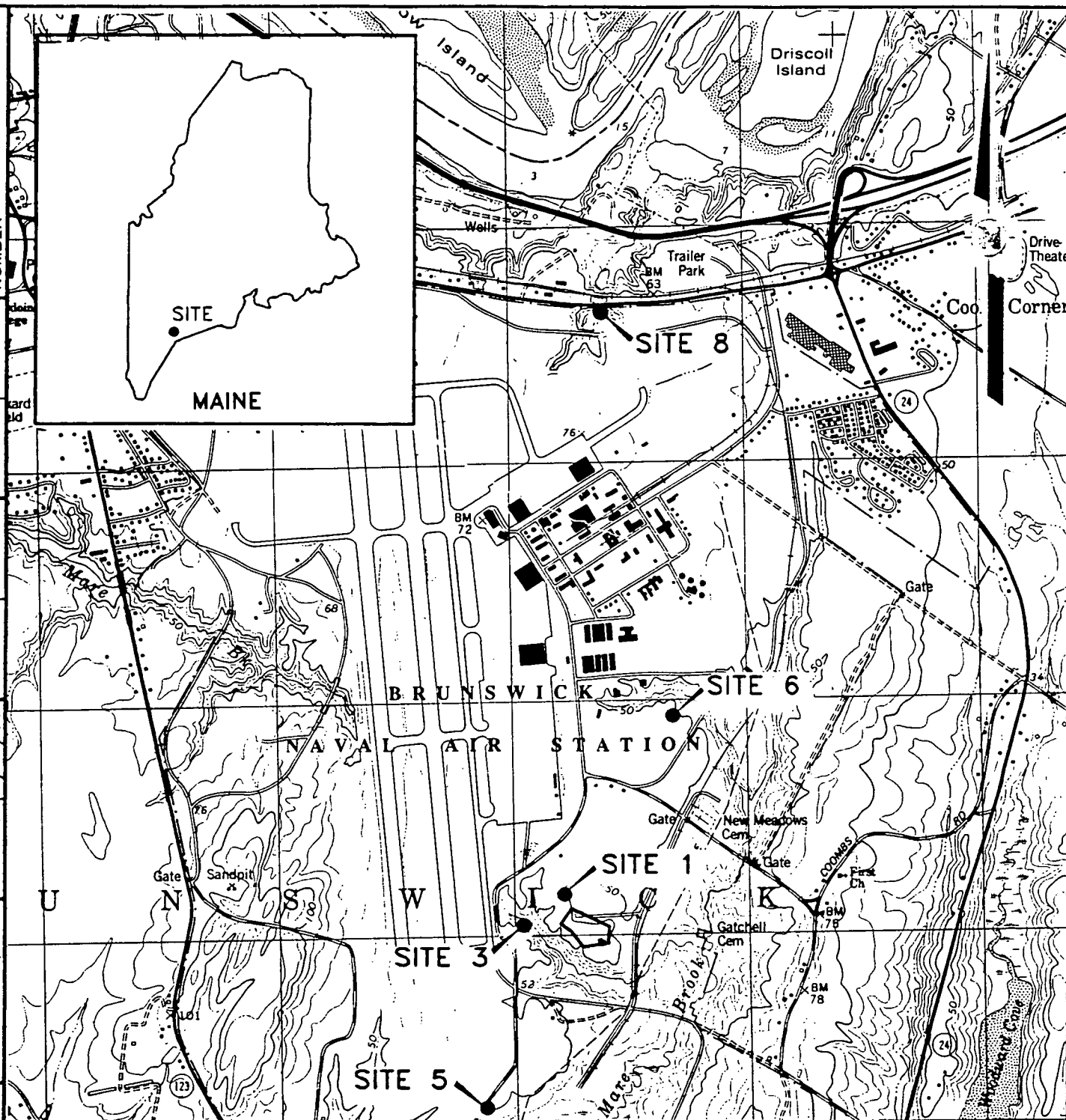
<p>TABLE 10-1</p> <p>WORKER MEDICAL PROFILE</p>		
<i>Item</i>	<i>Initial</i>	<i>Annual</i>
Medical History	X	X
Work History	X	X
Visual Acuity and Tonometry	X	X
Pulmonary Function Tests	X	X
Physical Examination	X	X
Audiometry Tests	X	X
Chest X-Ray	X	X
Complete Blood Counts	X	X
Blood Chem. (SSAC-23 or equivalent)	X	X
Urinalysis	X	X
Dermatology Examination	X	X
Electrocardiogram/Stress Test	X	X (based on age)

Specific Tests (as required):

(PCB blood or fat, urine mercury, urine arsenic, urine phenol, urine halomethanes, blood cyanide, cholinesterase-pseudo-cholinesterase, nerve conduction velocity tests, blood lead, urine lead.)

FIGURES

PLOT SCALE: 1" = 1'



S C A L E

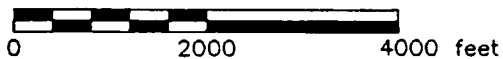


FIGURE 1-1

LOCATION MAP FOR SITES

REMEDATION OF SITES 1, 3, 5, 6, AND 8
NAVAL AIR STATION, BRUNSWICK, MAINE

PREPARED FOR

DEPARTMENT OF THE NAVY
NORTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND
LESTER, PENNSYLVANIA



OHM Remediation
Services Corp.

REFERENCE:

1. BASE MAP PREPARED FROM 7.5 MIN U.S.G.S. TOPOGRAPHIC MAP OF BRUNSWICK, MAINE QUADRANGLE, DATED: 1980, SCALE: 1:24000.
2. LOCATION OF SITES 1, 3, 5, 6, 8, OBTAINED FROM SHEET C2 PREPARED BY ABB ENVIRONMENTAL SERVICES, INC.

DRAWING NUMBER 16285-B1

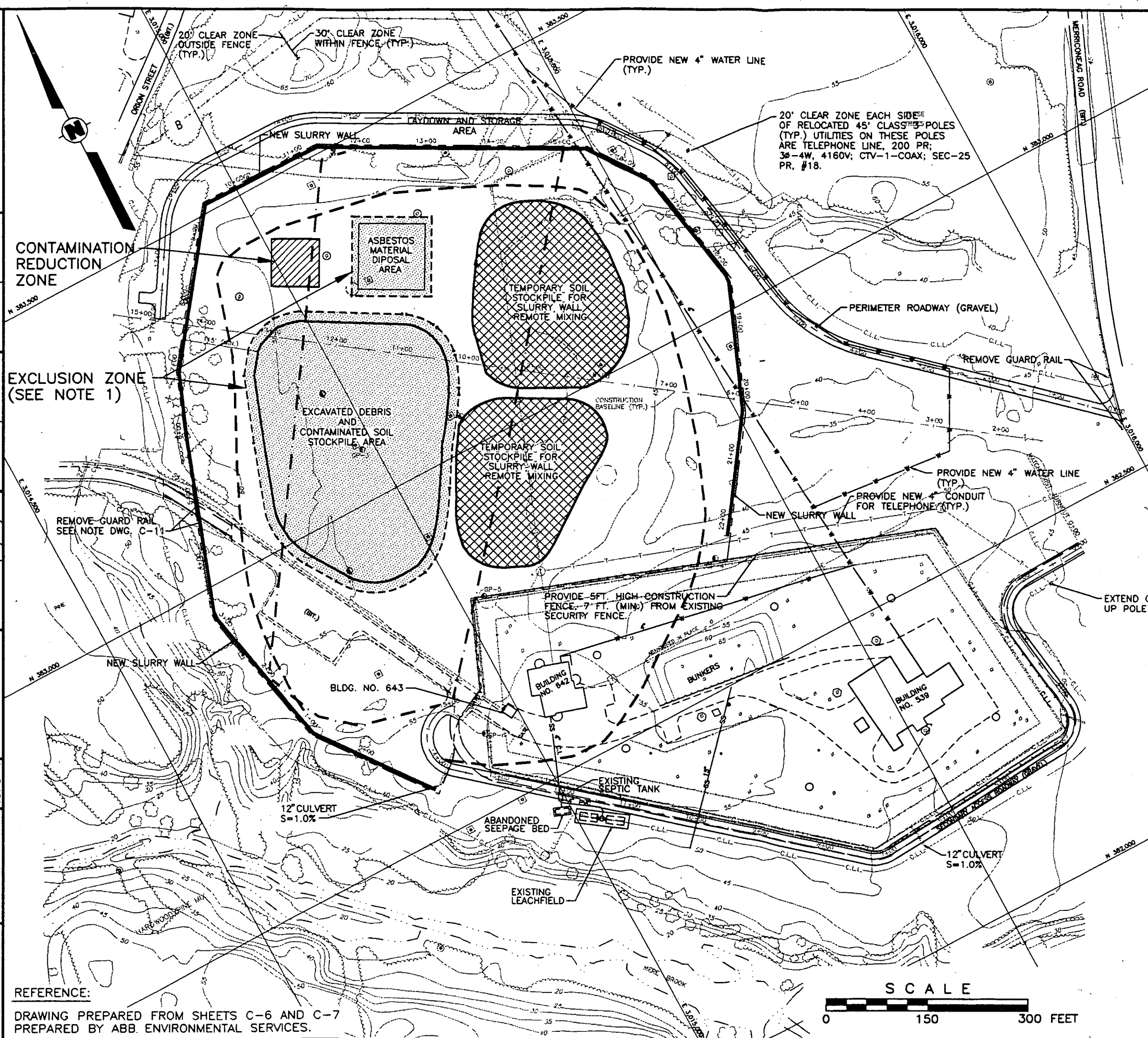
APPROVED BY

CHECKED BY

DRAWN BY

X-REF OHM CORPORATION
TOPO-4 PITTSBURGH, PA

PLOT SCALE: 1" = 1'



LEGEND:

- APPROXIMATE LOCATION EXISTING LANDFILL TRENCH (PER 1969 NASB PLAN)
- APPROXIMATE LIMITS OF WASTE
- NEW SLURRY WALL, 3 FT. WIDE
- ⊙ UTILITY POLE TO BE REMOVED
- ⊠ UTILITY POLE TO BE RELOCATED
- ⬤ RELOCATED UTILITY POLE LOCATION
- ▨ CONTAMINATION REDUCTION ZONE
- ▤ EXCLUSION ZONE
- ▧ TEMPORARY SOIL STOCKPILE FOR SLURRY WALL REMOTE MIXING

NOTE:

1. EXCLUSION ZONES WILL RECEIVE COVER AND BE CLOSED DAILY. THESE AREAS WILL BE OPENED, EXPANDED AND CLOSED AS NECESSARY FOR THE SITE OPERATION. ACTIVE AREAS WILL BE ENCLOSED WITH ORANGE FENCE.

FIGURE 1-2
SITES 1 AND 3 WORK ZONES
REMEDIATION OF SITES 1, 3, 5, 6, AND 8
NAVAL AIR STATION, BRUNSWICK, MAINE

PREPARED FOR
DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
LESTER, PENNSYLVANIA

**OHM Remediation
Services Corp.**

REFERENCE:

DRAWING PREPARED FROM SHEETS C-6 AND C-7
PREPARED BY ABB ENVIRONMENTAL SERVICES.

DRAWING NUMBER 16285-A9

APPROVED BY

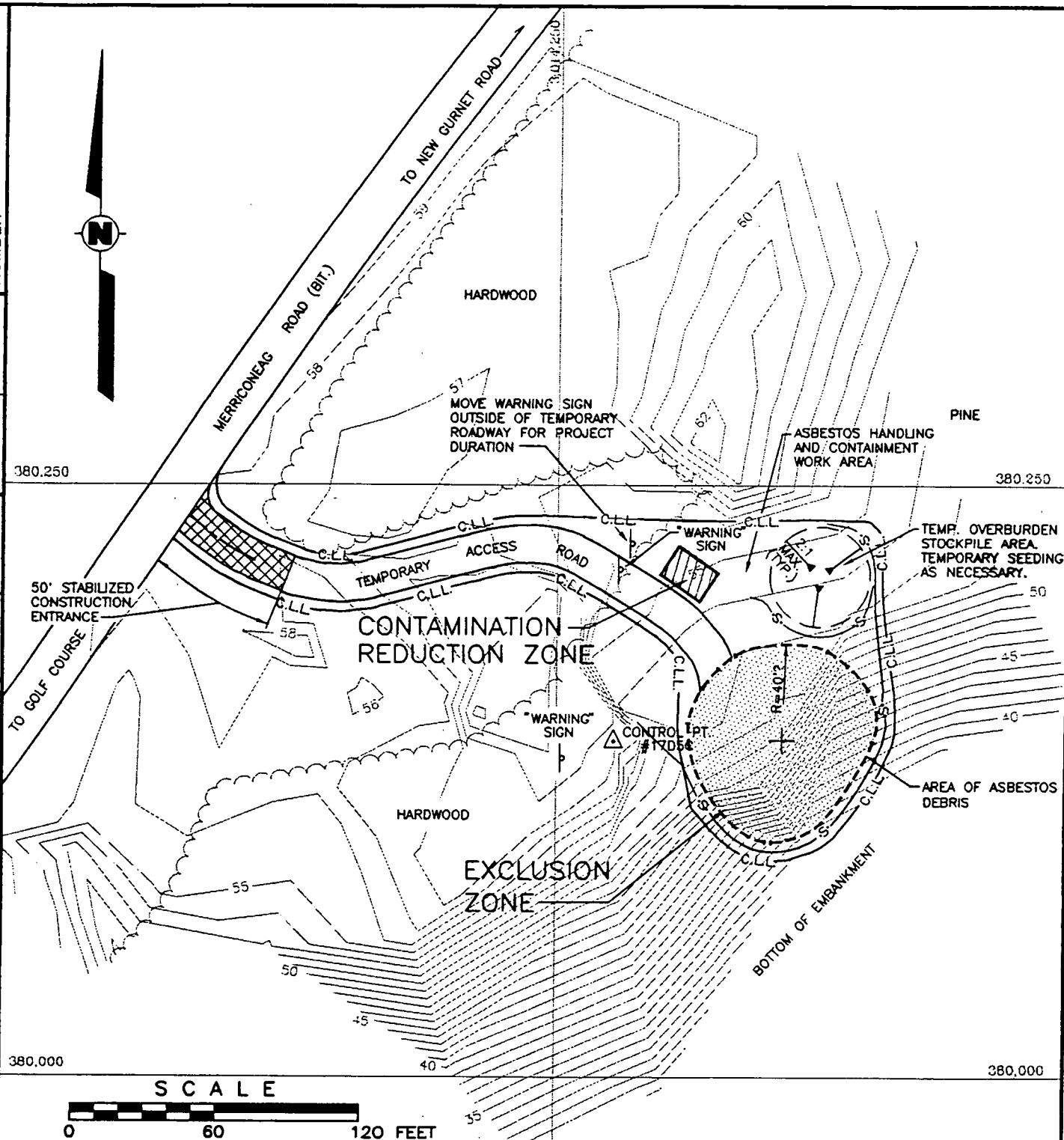
CHECKED BY

DRAWN BY M. WARNICK 2/15/95

OHM CORPORATION PITTSBURGH, PA

X-REF

PLOT SCALE: 1" = 60'



LEGEND:

- S— SILT FENCE
- 35— PROPOSED CONTOURS
- [Dotted Box] EXCLUSION ZONE
- [Hatched Box] CONTAMINATION REDUCTION ZONE

REFERENCE:

1. DRAWING PREPARED FROM SHEET C-21 PREPARED BY ABB ENVIRONMENTAL SERVICES

FIGURE 1-3

SITE 5 WORK ZONES
REMEDATION OF SITES 1, 3, 5, 6, AND 8
NAVAL AIR STATION, BRUNSWICK, MAINE

PREPARED FOR

DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
LESTER, PENNSYLVANIA



**OHM Remediation
Services Corp.**

DRAWING NUMBER
16285-A8

APPROVED BY

CHECKED BY

DRAWN BY
M. WARNICK 2/15/95

X-REF
OHM CORPORATION
PITTSBURGH, PA

PLOT SCALE: 1" = 80'

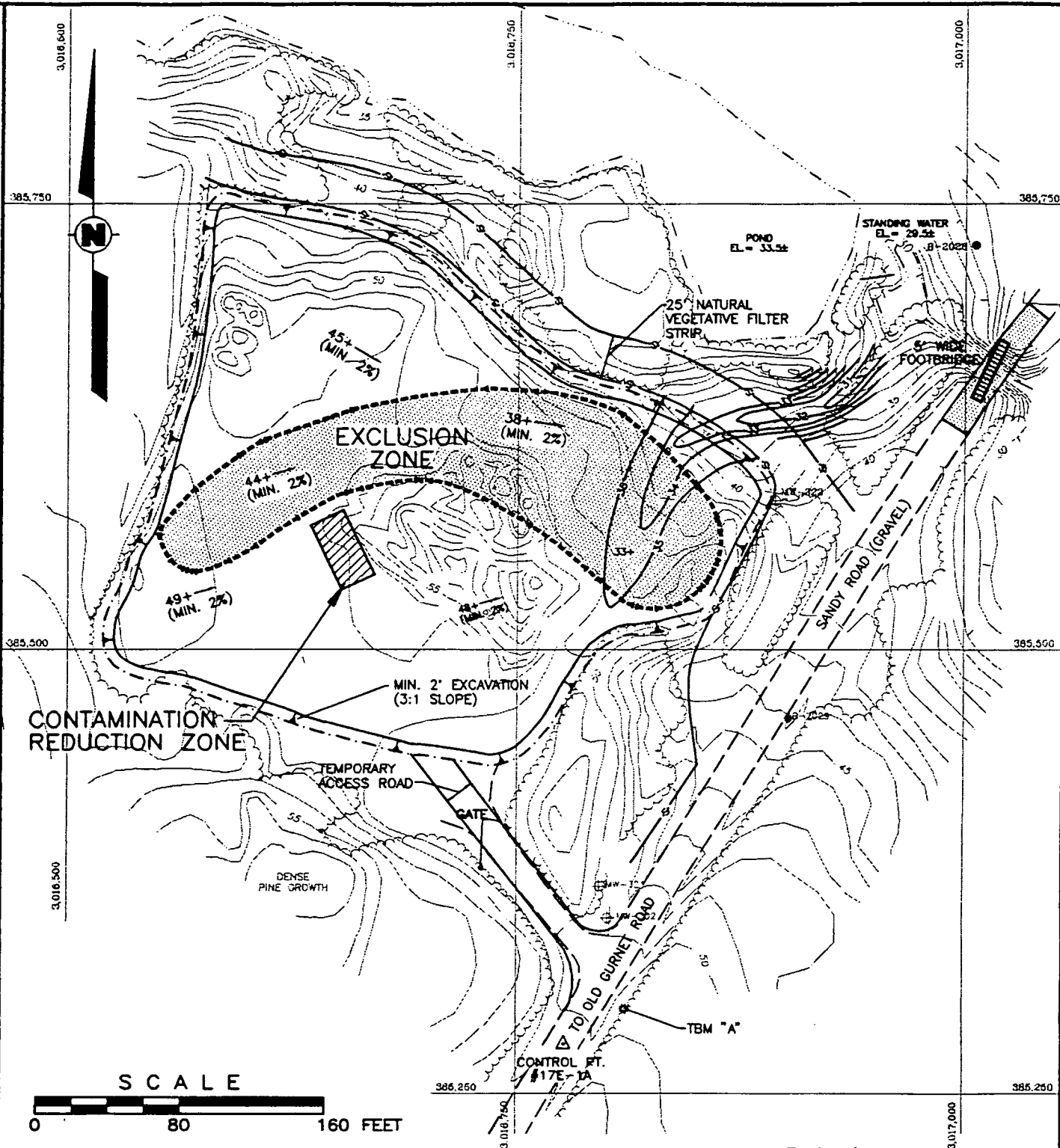


FIGURE 1-4

SITE 6 WORK ZONES
REMEDATION OF SITES 1, 3, 5, 6, AND 8
NAVAL AIR STATION, BRUNSWICK, MAINE

PREPARED FOR

DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
LESTER, PENNSYLVANIA



OHM Remediation
Services Corp.

DRAWING NUMBER 16285-A10

APPROVED BY

CHECKED BY

DRAWN BY

OHM CORPORATION
PITTSBURGH, PA

X-REF

PLOT SCALE: 1" = 60'

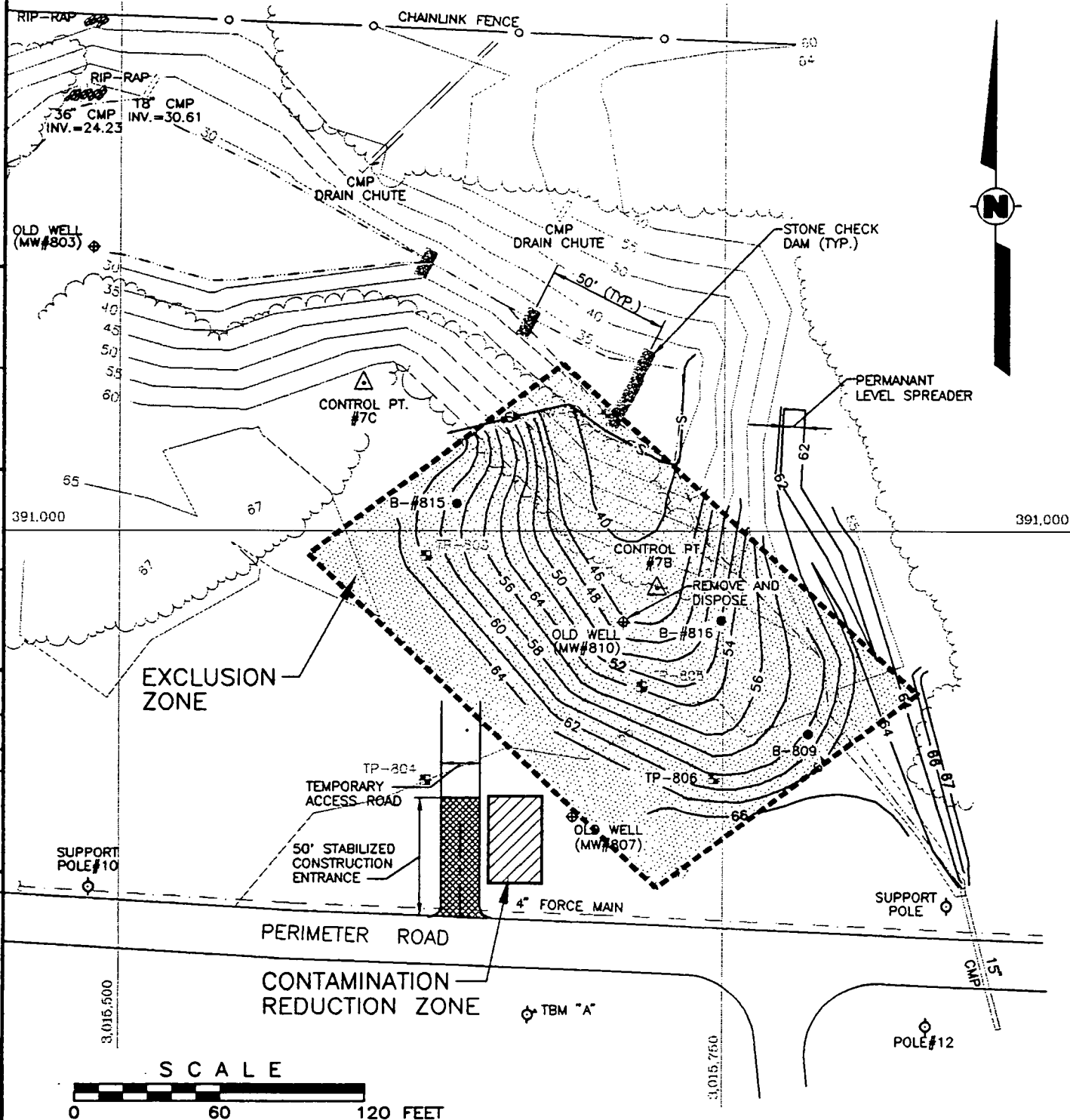


FIGURE 1-5

SITE 8 WORK ZONES
REMEDATION OF SITES 1, 3, 5, 6, AND 8
NAVAL AIR STATION, BRUNSWICK, MAINE

PREPARED FOR

DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
LESTER, PENNSYLVANIA



OHM Remediation
Services Corp.

LEGEND:

- S— SILT FENCE
- 35— PROPOSED CONTOURS
- [Dashed Line] EXCLUSION ZONE
- [Hatched Box] CONTAMINATION REDUCTION ZONE

REFERENCE:

1. DRAWING PREPARED FROM SHEET C-23
PREPARED BY ABB ENVIRONMENTAL
SERVICES

DRAWING NUMBER 16285-A3

APPROVED BY

CHECKED BY

DRAWN BY

OHM CORPORATION
PITTSBURGH, PA

X-REF

A.C. Smith 12/19/94

PLOT SCALE: 1" = 1"

DIRECTIONS TO HOSPITAL FROM BRUNSWICK NAS

GO THROUGH MAIN GATE OF BASE, MAKE A LEFT AT FIRST LIGHT ONTO RT.24 (BATH RD); GO 2.3 MILES, PASSING BOWDOIN COLLEGE ON LEFT, AND MAKE A LEFT ONTO MAINE STREET; MAKE THIRD RIGHT ONTO McKEEN STREET; FOLLOW BLUE/WHITE "H" SIGNS, MAKE A LEFT TURN ONTO BARIBEAU DRIVE. MID COAST HOSPITAL IS 300 YARDS ON RIGHT.

PHONE NUMBER: (207) 729-0181

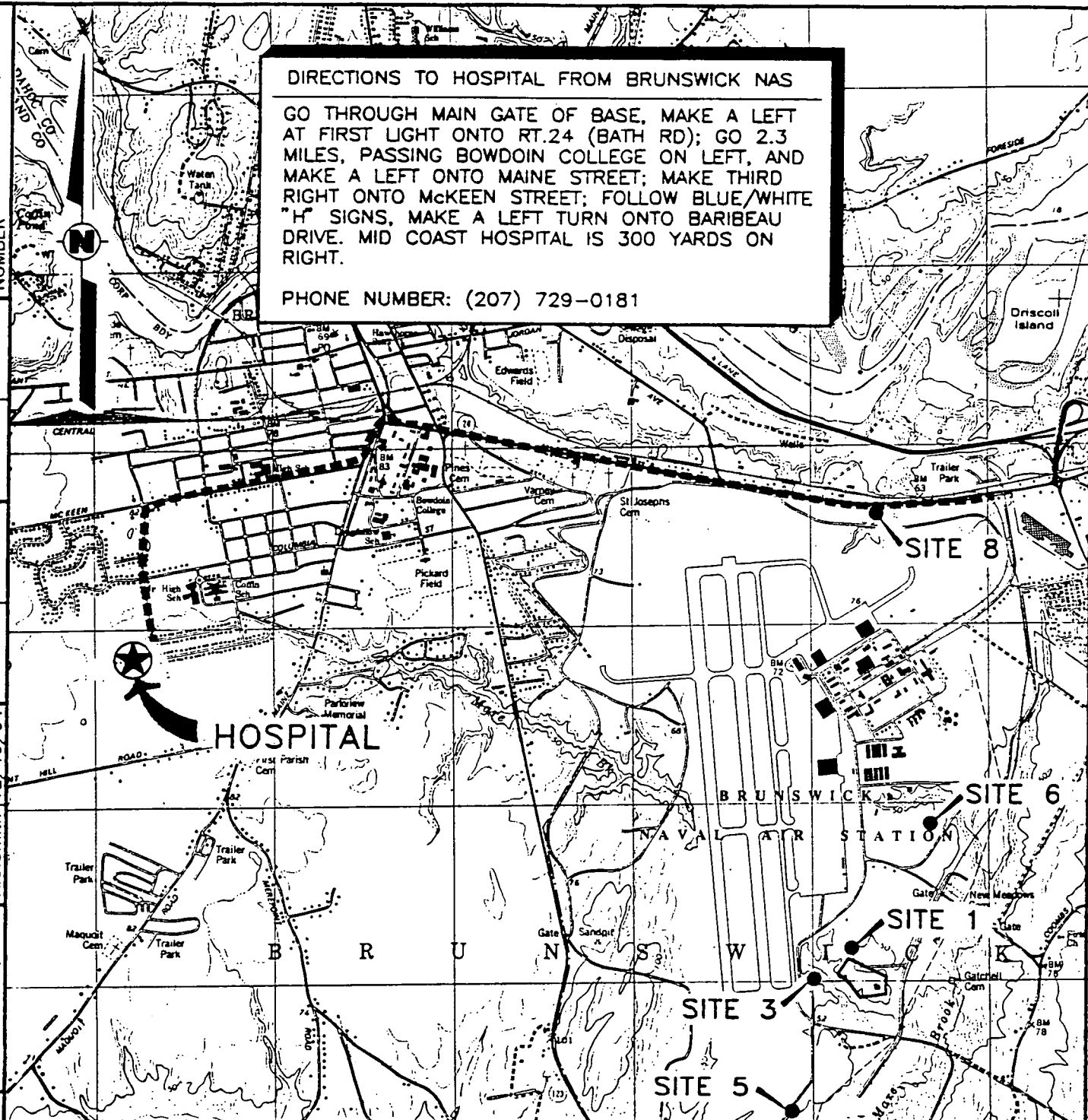


FIGURE 8-1

HOSPITAL MAP

REMEDATION OF SITES 1, 3, 5, 6, AND 8
NAVAL AIR STATION, BRUNSWICK, MAINE

PREPARED FOR

DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
LESTER, PENNSYLVANIA



**OHM Remediation
Services Corp.**

REFERENCE:

BASE MAP PREPARED FROM 7.5 MIN U.S.G.S.
TOPOGRAPHIC MAP OF BRUNSWICK, MAINE
QUADRANGLE, DATED: 1980, SCALE: 1:24000.

APPENDIX A

HEALTH AND SAFETY PLAN CERTIFICATION

HEALTH-AND-SAFETY PLAN CERTIFICATION

By signing this document, I am stating that I have read and understand the site health-and-safety plan for OHM Remediation Services Corp. personnel and visitors entering the sites.

[illegible]

APPENDIX B
OHM HAZARD COMMUNICATION PROGRAM

APPENDIX B - OHM HAZARD COMMUNICATION PROGRAM

1.0 OBJECTIVE

A Hazard Communication (Employee Right-To-Know) Program will be instituted at all OHM Remediation Services Corp. (OHM) facilities and job-sites. A copy of the written Hazard Communication Program contained in this procedure will be present at all OHM job-sites, shops, and facilities.

2.0 PURPOSE

The purpose of Hazard Communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at field project sites, shops, and facilities are transmitted (communicated), according to 29 CFR 1910.1200 and 29 CFR 1926.59 to all OHM personnel and OHM subcontractors.

3.0 GENERAL REQUIREMENTS

- 3.1** It is the responsibility of site supervisors, shop supervisors, and facilities managers to ensure that the Hazard Communication Program for the area under their supervision is updated as necessary.
- 3.2** Container Labeling--OHM personnel will ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced by on site operations. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.
- 3.3** Material Safety Data Sheets (MSDSs)--There will be an MSDS located on site for each hazardous chemical known to exist or which is being used on site. All MSDSs will be located in the site health and safety plan which can be found in the office trailer. MSDS's for products in use may be stored in a separate binder.
- 3.4** Employee Information and Training--Training employees on chemical hazards is accomplished through an ongoing corporate and regional training program. Additionally, chemical hazards will be communicated to employees through daily safety meetings held at OHM field projects and by an initial site orientation program.
- 3.5** OHM employees will be instructed on the following:
 - Chemicals and their hazards in the work area
 - How to prevent exposure to these hazardous chemicals
 - What the company has done to prevent workers' exposure to these chemicals
 - Procedures to follow if they are exposed to these chemicals
 - How to read and interpret labels and MSDSs for hazardous substances
 - Emergency spill procedures
 - Proper storage and labeling.

- 3.6 Before any new hazardous chemical is introduced on site, each employee will be given information in the same manner as during the initial safety class. The site supervisor will be responsible for seeing that the MSDS on the new chemical is available. During the mandatory morning safety briefing, information on each new chemical will be presented.

Should any new chemical be brought on site, the appropriate MSDSs will be added and reviewed with the employees.

1.0. GENERAL

The following written Hazard Communication Program has been established for OHM Remediation Services Corp. (OHM). The purpose of this program is to transmit information to the workers about the chemical hazards in the work place using various media. The transmittal of information will be accomplished by means of a comprehensive Hazard Communication Program, which will include container labeling and other forms of warning, material safety data sheets (MSDSs), and employee training in accordance with 29 CFR 1910.1200 and 29 CFR 1926.59.

Upon mobilization at the job site the Hazard Communication Program will be reviewed with all employees. Upon reading the Hazard Communication Program employees will be asked to sign the "Worker Hazard Communication Acknowledgment Form". The Hazard Communication Program will also be reviewed with new employees and visitors as they arrive on site. These persons will also be asked to sign the acknowledgment form. The Hazard Communication Program shall be available for review by anyone on site any time during normal work hours. OHM will accomplish the hazard communication requirements through formal safety training, departmental safety meetings, and job-site safety meetings.

The Health and Safety Department shall update the Hazard Communication Program when personnel responsibilities change, a new non-routine task is introduced, or an extremely hazardous material needs particular attention. This new program will then be distributed throughout the company.

2.0 RESPONSIBILITIES

Overall responsibility for compliance with the Hazard Communication Program rests with officers, managers, and supervisors of OHM. A brief outline of responsibilities for those persons directly involved with the program will follow. These responsibilities are not all inclusive, but are designed to give guidance in initial and long-term program development. Since each area is different, these responsibilities may vary.

This program is intended to cover those employees who are directly involved with the handling of hazardous chemicals or supervision of activities that involve the use of hazardous chemicals.

2.1 Health and Safety Department Responsibilities

- Review operations with site supervisors to determine what tasks require hazard communication training.

- Advise supervisory people as to which materials may need to be considered hazardous initially and eventually to ensure that hazard task determination is being done according to the written policy.
- Follow up through safety meetings and safety audits to ensure that supervisors are carrying out prescribed company policy.
- Notify supervisors immediately of any operating changes affecting the hazardous chemicals being used.
- Periodically audit the Hazard Communication Program's progress using the Hazard Communication Program audit sheet found at the end of this procedure.

2.2 Training Department Responsibilities

- Ensure that up-to-date records are maintained on training of all employees required to handle hazardous chemicals. The supervisor should keep copies of these records and should also send copies of the initial training to the corporate training secretary for the training file.
- Educate personnel upon initial 40-hour OSHA training to the requirements of the Hazard Communication Standard.

2.3 Site Supervisors' Responsibilities

- Identify jobs requiring the use of hazardous chemicals and provide a list of those jobs and chemicals to the health and safety department.
- Provide the training required by the Hazard Communication Standard and document training of employees in the safe handling of hazardous chemicals.
- Ensure inspection of engineering controls and personal protective equipment before each use. The health and safety department shall help determine a suitable inspection plan for each application as needed.
- Make daily surveys of the work area to ensure that safe practices are being followed. Advise employees of and document unsafe work practices on the first occasion and consider further unsafe work practices as disciplinary violations. Use documentation as topics of safety meetings.
- Ensure required labeling practices are being followed. Labels should be affixed to the container when it arrives. If the contents are transferred to another container, then all label information (manufacturer, manufacturer's telephone number, product name, target organ(s) and product number) must also be affixed to the new container, so that all containers of the material, regardless of size, are labeled. Contact the health and safety department for proper labels.

- Enforce all applicable safety and health standards through periodic documented audits.
- Before ordering a material, determine if a MSDS exists on file. Request a MSDS from the manufacturer for all new products.
- Contact the health and safety department upon receiving new MSDSs to ensure that they have a copy. If they do not, then the site supervisor shall forward a copy to them.

2.4 Employee Responsibilities

- Read and understand entire Hazard Communication Program.
- Obey established safety rules and regulations.
- Use all safety procedures and personal protective equipment as required by company procedures.
- Notify supervisor of the following:
 - Any symptoms or unusual effects that may be related to the use of hazardous chemicals
 - Any missing, incomplete, or unreadable labels on containers
 - Missing, damaged, or malfunctioning safety equipment.
- Use approved labels on containers; do not remove labels (labels are available from the health and safety department).
- Use only approved containers for hazardous chemicals. (Is chemical and container compatible and appropriate?)
- Know where emergency equipment and first-aid supplies are located.
- Know location of MSDSs. These will be located in the break/decon area and the job-site office trailer.
- Know what you are expected to do in case of an emergency. Before the commencement of any task, emergency considerations shall be made.

2.5 Shipping/Receiving Personnel Responsibilities

- The Project Control Technician (PCT) or other persons assigned by the site supervisor shall ensure MSDSs are received with initial shipment of a hazardous chemical; if not, contact purchasing to request the appropriate MSDS and also call the health and safety department to determine if there is a MSDS available until the requested MSDS arrives.

- Ensure labels with required information are affixed to all containers.
- Store hazardous materials in designated locations.
- Use proper personal protective equipment when handling hazardous chemicals.
- Report damaged containers or spills to the site supervisor and the site safety officer immediately.

3.0 HAZARD DETERMINATION

OHM will rely on MSDSs from chemical suppliers and manufacturers to meet hazard determination requirements. Other relevant data from laboratory analyses, chemical reference materials, and chemical manufacturers' written evaluation procedures will be utilized when warranted. No other method shall be used to determine a chemicals' hazards unless approved by the health and safety department.

4.0 LABELING

The site supervisor will be responsible for seeing that all containers arriving at OHM job sites are properly and clearly labeled. Site supervisors shall also check all labels for chemical identity and appropriate hazard warnings. If the hazardous chemical is regulated by OSHA in a substance specific health standard (29 CFR 1910), the site supervisor shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard. Any container that is not labeled shall be immediately labeled after initial discovery with the required information.

The site supervisor, general foreman, or foreman shall be responsible for seeing that all portable containers used in their work area are properly labeled with chemical identity and hazard warning. (Refer to MSDS for required labeling information.)

The site supervisor, general foreman, or foreman shall also ensure that labels on hazardous chemical containers are not removed or defaced unless the container is immediately marked with the required information and that all labels are legible in English and prominently displayed on the container or readily available in the work area throughout each shift.

If any container is found and the contents cannot be identified, the site supervisor shall be contacted immediately. When proper identification is made, a label shall be affixed to the container immediately. If it is discovered that no MSDS is available, the manufacturer and the health and safety department shall be contacted to assist in locating the proper MSDS. If there is no means of identifying the material in the container, the container shall be taken out of service, away from all personnel until it can be tested by the health and safety department or laboratory personnel. The site supervisor shall communicate their findings or awareness of such containers to all personnel working in the area and to the regional health and safety manager.

5.0 MATERIAL SAFETY DATA SHEETS (MSDS)

The site supervisor at OHM job sites will be responsible for maintaining a current MSDS relevant to the hazardous chemicals used on their job sites. The health and safety department will be responsible

for compiling the initial MSDS file for the job site and aiding all job sites with the completion and maintenance of their respective MSDS files.

All MSDSs shall be readily available for review by all employees during each work shift. Each job site will designate a clearly marked "Employee Right-to-Know" station where employees can immediately obtain a MSDS and the required information in an emergency. MSDSs shall also be made available, upon request, to designated OHM representatives, other employer's employees, and to any OSHA inspector in accordance with the requirements of 29 CFR 1910.1200(e).

Although manufacturers are required to provide employers with MSDSs on an initial chemical shipment, OHM purchasing agents (and site supervisors purchasing their own material) shall request MSDSs and updates to MSDSs on all purchase orders. Site supervisors that are without proper MSDSs shall be responsible for requesting this information from chemical manufacturers. The site supervisor shall maintain a file of follow-up letters for all hazardous chemical shipments they receive without MSDSs.

6.0 EMPLOYEE INFORMATION AND TRAINING

It is the responsibility of the supervisor in charge of each employee to ensure that the employee is properly trained. Training employees on chemical hazards and chemical handling is accomplished at the time of initial employment at OHM, whenever a new chemical (or physical) hazard is introduced into the work area, and through ongoing formal and informal training programs. Additionally, chemical hazards are communicated to employees through weekly and morning, job-site safety meetings, which shall be documented according to topic, major points discussed, and names of those attending (attendance is mandatory). Records of all formal training conducted at OHM are coordinated and maintained by the Training Department secretary.

At a minimum, OHM will inform employees on the following:

- The requirements of 29 CFR 1910.1200--Hazard Communication--Evaluating the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees. OHM shall accomplish employee training in several different ways including, but not limited, to 40-hour OSHA Hazardous Waste Worker Training (29 CFR 1910.120), shop safety meetings, job-site safety meetings, Health and Safety Department safety meetings, and formal and informal training about specific chemical hazards.
- The location and availability of the written Hazard Communication Program, list of hazardous chemicals, and MSDSs will be periodically posted on the employee bulletin boards providing the location of the above material.
- Any operations in their work area where hazardous chemicals are present.
- How to work safely with chemicals present in the workplace and minimize potential exposure.

Employee training shall include the following:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (monitoring instruments, visual appearance or odor, and acute and chronic health effects).
- The physical, chemical, and health hazards of the chemicals in the work area.
- The methods of preventing exposure to hazardous chemicals including the measures OHM has taken to protect the employees.
- Procedures to follow if OHM employees are exposed to hazardous chemicals (location of the nearest phone, emergency eyewash, and shower will be included). These discussions shall include proper operating procedures for all emergency equipment.
- The details of the OHM written Hazard Communication Program, including an explanation of the labeling system and the MSDSs, and how employees can obtain and use the appropriate hazard information.
- Standard operating procedures within each respective shop. OHM company policy determines what is considered standard operating procedures.
- Procedures for workers involved in non-routine tasks.

Each site supervisor shall ensure that the above training is emphasized to OHM employees. The health and safety department will ensure that each job site is properly informing and training all employees through group meetings and individual discussions. Whenever a new hazardous chemical is placed into use, the site supervisor shall inform the employees of the hazards said chemical may pose. The site supervisor shall also be responsible for obtaining and making available a MSDS for the new chemical.

7.0 HAZARDOUS NON-ROUTINE TASKS

Occasionally, employees at OHM are required to perform tasks which are considered to be non-routine. All tasks OHM considers non-routine shall be carefully discussed among the supervisor and those performing the task. This safety briefing shall include all possible hazards an employee may encounter while completing the task, including:

- Hazard recognition
- Chemicals involved and their hazardous properties
- Physical hazards
- Methods of avoiding hazards (monitoring instruments, proper personal protective equipment, etc.)

The following is a list of some of the non-routine tasks which may occur at OHM job sites. These tasks are all covered in detail in various OHM standard operating Procedures.

- 7.1 Confined Space Entry
- 7.2 Excavation, Trenching, and Shoring
- 7.3 Decontamination of Equipment
- 7.4 Laboratory Spills
- 7.5 High-Pressure Washer (Laser) Operation
- 7.6 Line Entry Procedure
- 7.7 Hot Work.

8.0 INFORMING CONTRACTORS

It shall be the responsibility of the OHM site supervisor to provide subcontractors with the following information:

- Hazardous chemicals to which they may be exposed while performing a task including the following:
 - Chemical properties
 - Physical properties
 - Acute/Chronic health effects.
- Location of "Employee Right-to Know" station which includes the following:
 - MSDS for work area
 - Hazard Communication Program
 - Other relevant safety material such as Project Health and Safety Plan (HASP).
- Precautionary measures to be taken to protect employees from chemical and physical hazards.
- Location of nearest emergency equipment (fire extinguisher, eyewash, shower, phone, first-aid kit, etc.).
- Procedures to follow in the event of employee exposure.
- Steps OHM has taken to reduce the risk of exposure to physical and chemical hazards including the following:
 - Safety meetings
 - Hazard Communication Program
 - Proper storage and labeling of hazardous chemicals
 - Health and safety department shop audits.

- The methods used to label all hazardous chemicals.
- Emergency evacuation signals and evacuation rally locations.

The health and safety department shall offer assistance in providing the above information to subcontractors working at OHM job sites. On initial visit by a subcontractor to OHM job sites, a "Contractor Right-to-Know" release form shall be completed. This form will state that the above information has been communicated to the perspective contractor.

Conversely, the site supervisor shall obtain the above information from subcontractors for hazardous materials they have brought to our projects.

8.1 Contractor Right-to-Know Acknowledgment

By signing this sheet, the signee is stating that an OHM employee or representative has briefed said signee on the essentials of OHM's Hazard Communication Program, including hazardous chemical(s) to which one may be exposed, location of program and MSDS, precautionary measures taken to protect contractors from chemical and physical hazards, location of nearest emergency equipment, procedures to follow in the event of employer's employee chemical exposure, and method used to label all hazardous chemicals.

Name	Date	Company
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

9.0 LIST OF HAZARDOUS CHEMICALS

The following is a list of hazardous chemicals used on this OHM job site. Further information on each hazardous chemical listed below can be found in the MSDS which are included in the site specific health and safety plan.

- Typical OHM Job-Site Hazardous Chemical Inventory List

<u>Available On Site</u>	<u>Chemicals</u>
<input type="checkbox"/>	Acetone
<input type="checkbox"/>	Acetylene
<input type="checkbox"/>	Activated Charcoal, Powder
<input type="checkbox"/>	Alum (Aluminum Sulfate)
<input type="checkbox"/>	Anti-fog Bausch & Lomb
<input type="checkbox"/>	Argon/Methan (95%/5%)
<input type="checkbox"/>	Brake Fluid
<input type="checkbox"/>	Calcium Hydroxide (Hydrated Lime)
<input type="checkbox"/>	Calibration Check Gas
<input type="checkbox"/>	Carbon
<input type="checkbox"/>	Caustic Soda (Sodium Hydroxide)
<input type="checkbox"/>	Citrikleen
<input type="checkbox"/>	Coal Fly Ash
<input type="checkbox"/>	Compressed Air
<input type="checkbox"/>	Diatomaceous Earth
<input type="checkbox"/>	Diesel Fuel
<input type="checkbox"/>	Dry Ice (Solid Carbon Dioxide)
<input type="checkbox"/>	Ethylene Glycol
<input type="checkbox"/>	Ferric Chloride
<input type="checkbox"/>	Freon
<input type="checkbox"/>	Gear Grease - Delta
<input type="checkbox"/>	Helium
<input type="checkbox"/>	Hexane
<input type="checkbox"/>	Hydraulic Fluid
<input type="checkbox"/>	Hydrochloric Acid
<input type="checkbox"/>	Hydrogen
<input type="checkbox"/>	Isobutylene
<input type="checkbox"/>	Kiln Dust
<input type="checkbox"/>	Methanol
<input type="checkbox"/>	Nitrogen
<input type="checkbox"/>	Nitrous Oxide
<input type="checkbox"/>	Oxygen
<input type="checkbox"/>	Penetone
<input type="checkbox"/>	Pentane
<input type="checkbox"/>	Polymers (Flocculants)
<input type="checkbox"/>	Premium Unleaded Gasoline



Available
On Site

Chemicals

PVC Solvent Cleaner

PVC Cement

Regular Leaded Gasoline

Starting Fluid

Stoddard Solvent

Sulfuric Acid

10W-40 Motor Oil - Shell

Tube Grease - Kendall

TU Type 555 Thread Sealing Compound

2-Cycle Oil - Wolf's Head

- Site-Specific Hazardous Chemical Inventory

APPENDIX C

MSDS LIST

318 ARSANILIC ACID, MONOSODIUM SALT

TOXICITY DATA:

ori-rat LD50: 216 mg/kg
ipr-rat LDLo: 400 mg/kg
ipr-mus LD50: 291 mg/kg
ivn-mus LD50: 100 mg/kg

3

CODEN:

TXAPA9 18,185,71
JPETAB 80,393,44
JMCMA9 9,221,66
CSLNX* NX#06774

Carcinogenic Determination: Human Positive IARC** 23,39,80. *Toxicology Review:* 85DHAX As., 77. OSHA Standard: Air: TWA 500 ug(As)/m3 FEREAC 39, 23540,74. Reported in EPA TSCA Inventory, 1980. **THR:** A human CARC. HIGH ori, ivn, ipr. See also arsenic. A grasshopper bait; a food additive permitted in the feed and drinking water of animals and/or for the treatment of food-producing animals. See arsenic compounds and aniline.

Fire Hazard: Mod. Decomp by heat to yield flammable vapors.

Disaster Hazard: Dangerous; when heated to decomp or on contact with acid or acid fumes, emits highly tox As and NO₂.

ARSANILIC ACID, MONOSODIUM SALT

CAS RN: 127855

NIOSH #: CF 9625000

mf: C₆H₇AsNO₂·Na; mw: 239.05

Tetra hydrate; white odorless cryst powder, faint salty taste. Sol in water, somewhat sol in alc.

SYNS:

NCI-C61176

(4-AMINOPHENYL)ARSONIC ACID SODIUM SALT

ANHYDROUS SODIUM ARSANILATE

ARSANILIC ACID SODIUM SALT

ATOXYL

SODIUM AMINARSONATE

SODIUM-P-AMINOBENZENEARSONATE

SODIUM AMINOPHENOL ARSONATE

SODIUM-P-AMINOPHENYLARSONATE

SODIUM-ANILINE ARSONATE

SODIUM ANILARSONATE

SODIUM ARSANILATE

SODIUM-P-ARSANILATE

SODIUM ARSONILATE

TOXICITY DATA:

scu-rat LD50: 75 mg/kg
scu-mus LD50: 400 mg/kg
scu-dog LDLo: 5 mg/kg
scu-rbt LDLo: 200 mg/kg

3

CODEN:

BIZEA2 184,360,27
12VXA5 9,1108,76
HBAMAK 4,1289,35
HBAMAK 4,1289,35

Toxicology Review: 85DHAX As., 77. OSHA Standard: Air: TWA 500 ug(As)/m3 FEREAC 39,23540,74. Selected by NTP for Carcinogenesis Bioassay as of December 1980.

THR: HIGH scu. Poisonous. Can cause blindness. A food additive in feed and drinking water.

Disaster Hazard: When heated to decomp it emits very tox fumes of As and NO₂.

ARSENIC

CAS RN: 7440382

NIOSH #: CG 0525000

mf: As; mw: 74.92

Slivery to black, brittle, crystalline and amorphous metalloid. mp: 814° @ 36 atm, bp: subl @ 612°, d: black crystals 5.724 @ 14°; black amor 4.7, vap. press: 1 mm @ 372° (sublimes). Insol in water; sol in HNO₃. See also arsenic vapor.

SYNS:

ARSENICALS

ARSENIC-75

ARSENIC BLACK

ARSEN (GERMAN, POLISH)

COLLOIDAL ARSENIC

GREY ARSENIC

METALLIC ARSENIC

TOXICITY DATA:

cyt-mus-ipr 4 mg/kg/48H-I
ori-rat TDLo: 605 ug/kg/(35 W Preg)
ori-mus TDLo: 120 mg/kg/
(preg):TER
ipr-mus TDLo: 40 mg/kg/(preg):TER
imp-rbt TDLo: 75 mg/kg:ETA
ori-man TDLo: 7857 mg/kg/
55Y:SKN
ori-man TDLo: 7857 mg/kg/55Y:GIT
ims-rat LDLo: 20 mg/kg

CODEN:

EXPEAM 37,129,81
GISAAA (8)30,77
TJADAB 15,31A,77

TJADAB 15,31A,77
ZEKBAI 52,425,42
CMAJAX 120,168,79

CMAJAX 120,168,79
NCIUS* PH 43-64-
886,SEPT,70

ASBIAL 24,442,38
CRSBAW 81,164,18
ASBIAL 24,442,38

scu-rbt LDLo: 300 mg/kg

ipr-gps LDLo: 10 mg/kg

ipr-gps LDLo: 300 mg/kg

Carcinogenic Determination: Human Positive IARC** 23,39,80. **Carcinogenic Determination:** Indefinite IARC** 2,48,73.

TLV: Air: 200 ug/m3 DTLVS* 4,24,80. *Toxicology Review:* AMIHAB 21,132,60; 85DHAX As., 77; JAVMA4 164(3),277,74; CTXAO 5(2),151,72; ARVPAX 16,95,76; KOTTAM 11(11),1300,75; FOREAE 7,313,42; AQMOAC #73-18,1973; PTPAD4 1,189,76; CLCHAU 19,361,73; 85CVA2 5,63,70; PEXTAR 12,102,69; JOCMA7 2,137,60; BNYMAM 54,413,78; AMTODM 3,209,77; 85CVA2 5,250,70; 27ZTAP 3,19,69. OSHA Standard: Air: TWA 500 ug/m3 FEREAC 39,23540,74. DOT: Poison B, Label: Poison FEREAC 41,57018,76. Occupational Exposure to Inorganic Arsenic recm std: Air: CL 2 ug/m3 NTIS**. "NIOSH Manual of Analytical Methods" VOL 1 139,140,180,188,192,196, VOL 3 5309, VOL 5 173#. NIOSH Current Intelligence Bulletin 14, 1976. Reported in EPA TSCA Inventory, 1980.

THR: Human CARC. A hmn SKN, GIT. An exper TER, ETA, ± CARC. MUT data. HIGH ims, scu, ipr. A poison. Used as a food additive in food for human ingestion. See also arsenic compounds.

Fire Hazard: Mod in the form of dust when exposed to heat or flame or by chemical reaction with powerful oxidizers such as bromates, chlorates, iodates, peroxides, Li, NCl₃, KNO₃, KMnO₄, Rb₂C₂, AgNO₃, NOCl, IF₅, CrO₃, ClF₃, ClO, BrF₃, BrF₅, BrN₃, RbC = CH, CaC = CH.

Explosion Hazard: Slight in the form of dust when exposed to flame.

Disaster Hazard: Dangerous; when heated or on contact with acid or acid fumes, emits highly tox fumes; can react vigorously on contact with oxidizing materials.

Incomp: Bromine azide, dirubidium acetylide, halogens, palladium, zinc, platinum, NCl₃, AgNO₃, CrO₃, Na₂O₂, hexafluoro isopropyl ideneamino lithium.

For further information see Vol. 1, No. 3 of DPIM Report.

M-ARSENIC ACID

CAS RN: 10102531

NIOSH #: CG 0760000

mf: AsHO₂; mw: 123.93

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



No. 382

VINYL CHLORIDE
(Revision A)
Issued: August 1978
Revised: August 1988

SECTION 1. MATERIAL IDENTIFICATION

26

Material Name: VINYL CHLORIDE

Description (Origin/Uses): Widely used to make PVC resins and plastics; also used in organic synthesis.

Other Designations: VCM; Vinyl Chloride Monomer; Chloroethylene; Chloroethene; C_2H_3Cl ; CAS No. 0075-01-4

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.



NFPA

HMIS

H	2	R	1
F	4	I	4
R	1	S	3
PPG*		K	4

*See sect. 8

SECTION 2. INGREDIENTS AND HAZARDS

%

EXPOSURE LIMITS

Vinyl Chloride, CAS No. 0075-01-4

Ca 100

OSHA PEL
8-Hr TWA: 1 ppm*

ACGIH TLV, 1987-88
TLV-TWA: 5 ppm, 10 mg/m³

Toxicity Data**
Rat, Oral, LD₅₀: 500 mg/kg

*The action level set by OSHA in 29 CFR 1910.1017 is 0.5 ppm. Exposures above this level are strictly regulated by extensive medical record keeping, reporting, surveillance, and other requirements. Consult 29 CFR 1910.1017 for details.

**See NIOSH, RTECS (No. KU9625000), for additional data with references to mutagenic, reproductive, and tumorigenic effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 61°F (16°C)

Molecular Weight: 107 Grams/Mole

Water Solubility (%): Insoluble

Vapor Density (Air = 1): 2.2

Appearance and Odor: A colorless gas; mild, sweet odor at high concentrations.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temperature

Flammability Limits in Air

-108.4°F (-78°C)

882°F (472°C)

% by Volume

3.6%

33%

Extinguishing Media: Vinyl chloride gas is a severe fire and explosion hazard; treat any fire involving it as an emergency. Try to shut off the flow of gas. Use a water spray to protect the personnel attempting this and to cool fire-exposed cylinders/containers of vinyl chloride.

Unusual Fire or Explosion Hazards: This heavier-than-air gas can flow along surfaces, reach distant sources of ignition, and flash back. Eliminate sources of ignition in the workplace, particularly in low-lying areas such as sumps, cellars, basement utility rooms, and underground piping systems.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Vinyl chloride is stable in closed, airtight, pressurized containers at room temperature under normal storage and handling conditions. It can undergo hazardous polymerization if it is heated or reacted with a polymerization catalyst, or if the concentration/activity of the added inhibitor becomes too low.

Chemical Incompatibilities: This material is incompatible with copper, aluminum, and other polymerization catalysts or free radical initiators like hydroquinone.

Conditions to Avoid: Do not allow sources of ignition such as open flame, unprotected heaters, lighted tobacco products, electric sparks, or excessive heat in work areas. Avoid prolonged exposure to air, especially in the presence of certain contaminants, because dangerous levels of polyperoxides may accumulate. Avoid exposure to sunlight; if the proper catalytic conditions occur, the vinyl chloride monomer may react with itself and undergo an explosive polymerization reaction. Violent ruptures of containers of this gas can occur.

Hazardous Products of Decomposition: During fires, vinyl chloride may decompose into toxic gases such as hydrogen chloride, carbon monoxide, and phosgene.

SECTION 6. HEALTH HAZARD INFORMATION

Vinyl chloride is listed as a carcinogen by the ACGIH, NTP, and IARC with sufficient epidemiological evidence from human studies. **Summary of Risks:** Vinyl chloride depresses the central nervous system (CNS), causing effects that resemble mild alcohol intoxication; however, these effects can progress to narcosis, eventual collapse, and even death as the intensity and/or duration of the exposure continues. Thrombocytopenia (decrease in blood platelets) has been reported following exposures.

Medical Conditions Aggravated by Long-Term Exposure: Possible liver effects. **Target Organs:** Respiratory system, skin, eyes, kidneys, hematopoietic (blood) system, and musculoskeletal system. **Primary Entry:** Inhalation. **Acute Effects:** Head-ache, dizziness, lightheadedness, skin and eye irritation. **Chronic Effects:** Cancer, especially angiosarcoma of the liver.

FIRST AID: Eyes. Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Skin. Skin contact with liquid vinyl chloride causes frostbite (cryogenic injury). Treat this accordingly.

Inhalation. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed.

Ingestion. Unlikely.

GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Treat any vinyl chloride gas leak as an emergency. Preplan emergency responses and make sure all personnel know about them. Notify safety personnel, evacuate all nonessential personnel, provide maximum explosion-proof ventilation, and eliminate all sources of ignition immediately. Make sure cleanup personnel have protection against contact with this material and inhalation of its vapor (see sect. 8). **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations for disposal. Follow Federal, state, and local regulations.

OSHA Designations

Air Contaminant (29 CFR 1910.1000 Subpart Z)

Vinyl chloride is specifically regulated by OSHA at 29 CFR 1910.1017 as a suspected carcinogenic agent.

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U043

CERCLA Hazardous Substance, Reportable Quantity: 1 lb (0.454 kg), per Clean Water Act (CWA), section 307 (a); Clean Air Act (CAA), section 112; and Resource Conservation and Recovery Act (RCRA), section 3001.

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Follow OSHA eye- and face-protection regulations

(29 CFR 1910.133). **Respirator:** Consult the *NIOSH Pocket Guide to Chemical Hazards* for general recommendations on respirators. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine use (leaks or cleaning reactor vessels and storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying

respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves; boots; aprons; head covers; and clean, impervious, body-covering clothing to prevent any possibility of skin contact with vinyl chloride. All clothing must be flame resistant. **Ventilation:** Install and operate general and local ventilation systems powerful enough to maintain airborne levels of vinyl chloride below the OSHA PEL standard cited in section 2. All ventilation systems must be of maximum explosion-proof design, e.g., nonsparking, electrically grounded and bonded. **Safety Stations:** Make eyewash stations, safety showers, and washing facilities available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. **Other:** Design all engineering systems to be explosion-proof in areas where vinyl chloride gas may occur. Pressure check all pipes and equipment used with this gas and make sure that all connections are leak tight. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store vinyl chloride in a cool, dry, well-ventilated area away from sources of ignition and incompatible chemicals. Outside or detached storage is recommended. Shade containers from radiant heat and direct sunlight. **Special Handling/Storage:** Vinyl chloride is shipped/stored as a pressurized gas in cylinders or tank cars. Protect these containers against physical damage and regularly inspect them for cracks, leaks, or faulty valves. Ground and bond all containers used in shipping/transferring operations. Store cylinders upright; secure them tightly; do not drag or slide them; move them in a carefully supervised manner with a suitable hand truck. Monitor the activity and concentration of the added inhibitor to the vinyl chloride product. Follow your supplier's recommendations concerning proper shelf life, rotation of inventory, and maintenance of purity. **Engineering Controls:** Make all engineering systems (ventilation, production, etc.) of maximum explosion-proof design. **Comments:** Perform all operations with vinyl chloride carefully to prevent accidental ignition. Do not smoke in any use or storage area. Maintain the valve protection cap in place until immediately before using vinyl chloride. Insert a check valve or trap into the transferral line to prevent a dangerous backflow into the original container. Use pressure-reducing regulators when connecting cylinders to lower-pressure piping systems. Obtain detailed handling, shipping, and storage information from your supplier. A trained chemist or safety specialist familiar with the physical and chemical properties of this material should be present during all work operations.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Vinyl Chloride

DOT Label: Flammable Gas

IMO Label: Flammable Gas

DOT ID No. UN1086

DOT Hazard Class: Flammable Gas

IMO Class: 2.1

References: 1, 2, 12, 73, 84-94.

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Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
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GENIUM PUBLISHING CORP.

No. 373

METHYL CHLORIDE
(Revision A)
Issued: May 1981
Revised: November 1987

SECTION 1. MATERIAL IDENTIFICATION

Material Name: METHYL CHLORIDE

Description (Origin/Uses): Used as a refrigerant.

Other Designations: Chloromethane; CH_3Cl ; NIOSH RTECS No. PA6300000; CAS No. 0074-87-3

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS

H 2

F 4

R 1

PPG*

*See sect. 8

R 1

I 3

S 1

K 4



SECTION 2. INGREDIENTS AND HAZARDS

Methyl Chloride, CAS No. 0074-87-3



*This material can be absorbed through intact skin, which contributes to overall exposure.

**Maximum allowable concentration

***NIOSH views methyl chloride as an occupational carcinogen and suggests that all exposures to it be reduced to the lowest feasible level.

****See NIOSH, RTECS, for additional data with references to reproductive and mutagenic effects.

%

ca 100

EXPOSURE LIMITS

ACGIH TLVs (Skin*), 1987-88

TLV-TWA: 50 ppm, 105 mg/m³

TLV-STEL: 100 ppm, 205 mg/m³

OSHA PELs (Skin*)

8-Hr TWA: 100 ppm

Ceiling: 200 ppm (30 Min)

MAC**: 300 ppm for 5 Min in any 3-Hr period

NIOSH REL: Ca***

Toxicity Data****

Rat, Inhalation, LC_{50} : 15,200 mg/m³ (30 Min)

Mouse, Inhalation, LC_{50} : 3146 ppm (7 Hrs)

SECTION 3. PHYSICAL DATA

Boiling Point: -10.7°F (-23.7°C)

Vapor Density (Air = 1): 1.8

Water Solubility: 100 (complete)

Melting Point: -143°F (-97°C)

Molecular Weight: 50.49 Grams/Mole

% Volatile by Volume: 100%

Appearance and Odor: A colorless, odorless gas that compresses under pressure to a cryogenic liquid with poor warning properties (see sect. 6).

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temperature

Flammability Limits in Air

*

*

% by Volume

8.1

17.2

Extinguishing Media: *Methyl chloride is an extremely explosive and flammable gas. If it is burning, try to stop the flow of gas; use a water spray to protect men effecting the shutoff and to cool fire-exposed containers.

Unusual Fire or Explosion Hazards: Methyl chloride is denser than air and will collect in enclosed or low-lying areas like sumps, so eliminate ignition sources there.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Methyl chloride is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

Chemical Incompatibilities: This material is incompatible with strong oxidizing agents; amines; amides; and metals like Zn, Al, Mg, Na, and K.

Conditions to Avoid: Do not allow ignition sources like open flame, unprotected heaters, lighted tobacco products, electric sparks, and excessive heat in work areas because of the extreme flammability of this material.

Hazardous Products of Decomposition: Extremely toxic gases like phosgene and HCl are produced during fire conditions.

SECTION 6. HEALTH HAZARD INFORMATION

Methyl chloride is listed as an occupational carcinogen by NIOSH.

Summary of Risks: "Inhalation of high concentrations of methyl chloride causes serious central nervous system (CNS) damage, lingering illness, and sometimes death. Because methyl chloride has so little odor and [often a slowly progressive or] a mild narcotic action, a person may be exposed to considerable concentrations without being aware of the danger. The onset of symptoms of poisoning such as dizziness, headache, optical difficulties, nausea, and vomiting may be delayed for many hours" (Genium ref. 84, pp. 49-62). "Severe exposures require hospitalization, monitoring, and treatment for acidosis. . . . Recovery may be prolonged and permanent neurologic impairment has been reported" (Genium ref. 100, p. 354).

Medical Conditions Aggravated by Long-Term Exposure: CNS disorders. **Target Organs:** CNS, liver, kidneys, eyes, and skin. **Primary Entry:** Inhalation, skin absorption/contact. **Acute Effects:** Neurologic effects like mental confusion, dizziness, staggering gait, slurred speech, and drowsiness. **Chronic Effects:** Anorexia, nervousness, insomnia, incoordination, diminished vision, and emotional instability.

FIRST AID

Eye Contact: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. **Skin Contact:** Immediately wash the affected area with soap and water because of the increased hazard from absorption. Carefully monitor the exposed skin area for frostbite damage (cryogenic injuries) and treat it accordingly. **Inhalation:** Remove victim to fresh air; restore and/or support his breathing as needed. **Ingestion:** This type of exposure to methyl chloride is extremely unlikely because it appears as a pressurized cryogenic (extremely low-temperature) liquid.

GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, provide ventilation, and eliminate all ignition sources immediately. Cleanup personnel need protection against contact and inhalation of vapor (see sect. 8). Try to shut off the flow of methyl chloride gas.

Waste Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Air Contaminant (29 CFR 1910.1000 Subpart Z)

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U045

CERCLA Hazardous Substance, Reportable Quantity: 1 lb (0.454 kg)

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Follow the eye- and face-protection guidelines of 29 CFR 1910.133. **Respirator:** Use a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* (Genium ref. 88) for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow the respirator guidelines in 29 CFR 1910.134. For emergency or nonroutine use (e.g., cleaning reactor vessels or storage tanks) use an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Other Equipment:** Wear neoprene or polyvinyl alcohol-impregnated gloves, boots, aprons, and clean, impervious, body-covering clothing to prevent any possibility of skin contact. **Ventilation:** Install and operate general and local maximum explosion-proof ventilation systems of sufficient power to control airborne levels of methyl chloride below the OSHA PELs cited in section 2. **Safety Stations:** Make eyewash stations, washing facilities, and safety showers available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment.

Comments: Practice good personal hygiene; always wash thoroughly after using this material. Avoid transferring it from hands to mouth while eating, drinking, or smoking. Do *not* smoke, eat, or drink in any work area. Avoid inhalation of vapor!

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage Segregation: Store methyl chloride in a cool, dry, well-ventilated area away from oxidizing agents, ignition sources, and chemical incompatibilities (see sect. 5). Outside or detached storage is advised for this highly flammable gas. **Special Handling/Storage:** Methyl chloride is shipped or stored as a pressurized liquid in cylinders or tank cars. Protect these containers against physical damage and regularly inspect them for leaks, cracks, or faulty valves. All containers used in shipping/transferral operations must be electrically grounded to prevent static sparks. **Engineering Controls:** Preplan handling and emergency response procedures prior to use. All engineering systems (ventilation, production, etc.) must be of maximum explosion-proof design. Methyl chloride must be used in closed engineering systems because of its flammability/explosivity hazards (see sect. 4). This prevents dispersion of this highly flammable gas into work areas. **Warning:** Methyl chloride gas has extremely poor warning properties. An automatic air-monitoring system is needed if this gas is used in large amounts because even highly toxic concentrations of this material will be colorless and odorless.

Comments: All operations with methyl chloride must be done carefully to prevent accidental ignition of this highly flammable liquid. Do not smoke in any use or storage area! Follow recommended standard operating procedures for using liquefied cryogenic gases.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Methyl Chloride

DOT Hazard Class: Flammable Gas

IMO Class: 2.3

References: 1, 2, 12, 73, 84-94, 100, 103. PJI

DOT ID No. UN1063

IMO Label: Poison Gas and Flammable Gas

DOT Label: Flammable Gas

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Approvals *[Signature]*

Indust. Hygiene/Safety *[Signature]*

Medical Review *[Signature]*

Material Safety Data Sheet

From Genium's Reference Collection
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No. 359
ETHYLENE DICHLORIDE
(Formerly 1,2-Dichloroethane)
(Revision C)
Issued: November 1978
Revised: August 1987

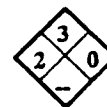
23

SECTION 1. MATERIAL IDENTIFICATION

CHEMICAL NAME: ETHYLENE DICHLORIDE (Changed to reflect common industrial practice)
DESCRIPTION (Origin/Uses): Made from acetylene and HCl. Used as a degreaser, a scavenger in leaded gasoline, as an intermediate in the manufacture of vinyl chloride, in paint removers, in wetting and penetration agents, in ore flotation processes, as a fumigant, and as a solvent for fats, oils, waxes, and gums.

OTHER DESIGNATIONS: 1,2-Dichloroethane; sym-Dichloroethane; Dutch Liquid; Dutch Oil; EDC; Ethane Dichloride; Ethylene Chloride; 1,2-Ethylene Dichloride; Glycol Dichloride; $C_2H_4Cl_2$; NIOSH RTECS KJ0525000; CAS #0107-06-2

MANUFACTURERS/SUPPLIERS: Available from several suppliers, including:
Dow Chemical USA, 2020 Dow Center, Midland, MI 48640; Telephone: (517) 636-1000



HMS R 1
H 1 I 4
F 3 S 2
R 0 K 4
PPE*
* See Sect 8

COMMENTS: Ethylene dichloride is a flammable, toxic liquid.

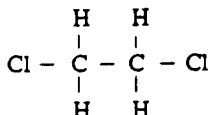
SECTION 2. INGREDIENTS AND HAZARDS

Ethylene Dichloride, CAS #0107-06-2; NIOSH RTECS #KJ0525000

100

HAZARD DATA

ACGIH Values 1987-88
TLV-TWA: 10 ppm, 40 mg/m³
OSHA PEL* 1986-87
8-Hr TWA: 50 ppm;
Ceiling: 100 ppm (15 Min.)
NIOSH REL 1986-87
10-Hr TWA: 1 ppm
Ceiling: 2 ppm (15 Min.)
Toxicity Data
Man, Inhalation, TC_{Lo}: 4000 ppm/1 Hr
Human, Oral, TD_{Lo}: 428 mg/kg
Man, Oral, TD_{Lo}: 892 mg/kg
Man, Oral, LD_{Lo}: 714 mg/kg
Rat, Oral, LD₅₀: 670 mg/kg



*The maximum allowable peak concentration (above the ceiling level value) of ethylene dichloride is 200 ppm for 5 minutes in any 3-hour period.

COMMENTS: Additional data concerning toxic doses and tumorigenic, reproductive, and mutagenic effects is listed (with references) in the NIOSH RTECS 1983-84 supplement, pages 865-66.

SECTION 3. PHYSICAL DATA

Boiling Point ... 182.3°F (83.5°C)

Vapor Pressure ... 87 Torr at 77°F (25°C)

Water Solubility ... Soluble in about 120 Parts Water

Vapor Density (Air = 1) ... 3.4

Appearance and odor: Colorless, clear liquid. Sweet, chloroformlike odor is typical of chlorinated hydrocarbons. The recognition threshold (100% of test panel) for ethylene dichloride is 40 ppm. Odor detection probably indicates an excessive exposure to vapor. High volatility and flammability, coupled with its toxicity and carcinogenic potential, make this material a major health hazard.

COMMENTS: Ethylene dichloride is miscible with alcohol, chloroform, and ether.

Evaporation Rate (n-BuAc = 1) ... Not Listed

Specific Gravity ... 1.2569 at 69°F (20°C)

Freezing Point ... -31.9°F (-35.5°C)

Molecular Weight ... 98.96 Grams/Mole

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temperature

Flammability Limits in Air

See Below

775°F (413°C)

% by Volume

6.2

15.9

EXTINGUISHING MEDIA: Use chemical, carbon dioxide, alcohol foam, water spray/fog, or dry sand to fight fires involving ethylene dichloride. Direct water sprays may be ineffective extinguishing agents, but they may be successfully used to cool fire-exposed containers. Use a smothering effect to extinguish fires involving this material. **UNUSUAL FIRE/EXPLOSION**

HAZARDS: Ethylene dichloride is a dangerous fire and explosion hazard when exposed to sources of ignition such as heat, open flames, sparks, etc. Its vapors are heavier than air and can flow along surfaces to distant, low-lying sources of ignition and flash back. If it is safe to do so, remove this material from the fire area. Ethylene dichloride burns with a smoky flame.

SPECIAL FIRE-FIGHTING PROCEDURES: Wear a self-contained breathing apparatus with a full facepiece operated in a pressure-demand or another positive-pressure mode.

COMMENTS: Flash Point and Method: 56°F (13°C) CC; 65°F (18°C) OC.

OSHA Flammability Class (29 CFR 1910.106): IB. DOT Flammability Class (49 CFR 173.115): Flammable Liquid

SECTION 5. REACTIVITY DATA

Ethylene dichloride is stable. Hazardous polymerization cannot occur.

CHEMICAL INCOMPATIBILITIES include strong oxidizing agents. Explosions have occurred with mixtures of this material and liquid ammonia or dimethylaminopropylamine. Finely divided aluminum or magnesium metal may be hazardous in contact with ethylene dichloride.

CONDITIONS TO AVOID: Eliminate sources of ignition such as excessive heat, open flames, or electrical sparks, particularly in low-lying areas, because the explosive, heavier-than-air vapors will concentrate there.

PRODUCTS OF HAZARDOUS DECOMPOSITION can include vinyl chloride, chloride fumes, and phosgene. Phosgene is an extremely poisonous gas. Products of thermal-oxidative degradation (i.e., fire conditions) must be treated with appropriate caution.

SECTION 6. HEALTH HAZARD INFORMATION

Ethylene dichloride is listed as an anticipated human carcinogen by the NTP and as a probable human carcinogen (Group 2B), by the IARC. It was found to be an animal-positive carcinogen by the IARC. NCI reported positive results (mouse, rat) from its carcinogenesis bioassay. **SUMMARY OF RISKS:** Ethylene dichloride is considered to be one of the more toxic of the common chlorinated hydrocarbons. Deaths from accidental ingestion of this material have been reported. Inhalation of vapors reportedly caused three fatalities. Excessive inhalation of ethylene dichloride vapors can cause respiratory irritation, intoxication, narcotic and anesthetic effects, vomiting, dizziness, depression, and diarrhea. The hepatotoxic (injurious to liver) effects of this material are significant. The systemic effects from overexposure can appear in the liver, kidneys, digestive tract, blood, lungs, adrenal glands, and the central nervous system. Tests on animals have revealed reproductive failure and fetal resorption. There may be increased risk to nursing infants of exposed mothers. **TARGET ORGANS:** Central nervous system, eyes, kidneys, liver, heart, adrenal glands, and skin. **PRIMARY ENTRY:** Inhalation, absorption through skin, oral, or eye contact. **ACUTE EFFECTS:** Skin contact causes irritation, defatting, and, if repeated or prolonged, burning. Eye contact causes irritation and serious injury (clouding of the cornea) if it is not removed promptly. **CHRONIC EFFECTS:** Injuries to the liver (hepatotoxicity) and kidneys, weight loss, low blood pressure, jaundice, oliguria (reduced excretion of urine), or anemia. **MEDICAL CONDITIONS AGGRAVATED BY LONG-TERM EXPOSURE:** Persons taking anticoagulants could experience an increase in tendency to bleed. Persons taking insulin face an increased risk of lowered blood sugar. **FIRST AID:** Be prepared to restrain a hyperactive victim. **EYE CONTACT:** Flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Get medical help. **SKIN CONTACT:** Immediately flush the affected area with water. Wash thoroughly with soap and water. Remove and launder contaminated clothing before wearing it again; clean material from shoes and equipment. Get medical help. **INHALATION:** Remove victim to fresh air; restore and/or support his breathing as needed. Get medical help. **INGESTION:** Never give anything by mouth to someone who is unconscious or convulsing. Rinse victim's mouth with water. Oxygen and artificial respiration may be needed. Get medical help. **GET MEDICAL ASSISTANCE = IN PLANT, PARAMEDIC, COMMUNITY.** Get prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Before using ethylene dichloride, it is essential that proper emergency procedures be established and made known to all personnel involved in handling it. Notify safety personnel of ethylene dichloride spills or leaks and implement containment procedures. Remove and eliminate all possible sources of ignition such as heat, sparks, and open flames from the area. Cleanup personnel should use protection against inhalation of vapors and contact with liquid. Contain spills by using an absorbent material such as dry sand or vermiculite. Use nonsparking tools to mix waste material thoroughly with absorbent and place it in an appropriate container for disposal. Flush trace residues with large amounts of water. Do not flush waste to sewers or open waterways. **WASTE DISPOSAL:** Consider reclamation, recycling, or destruction rather than disposal in a landfill. Waste may be burned in an approved incinerator equipped with an afterburner and a scrubber. Follow Federal, state, and local regulations. Ethylene dichloride is designated as a hazardous substance by the EPA (40 CFR 116.4). Ethylene dichloride is reported in the 1983 EPA TSCA Inventory. EPA Hazardous Waste Number (40 CFR 261.33): U077 EPA Reportable Quantity (40 CFR 117.3): 5000 lbs (2270 kgs) Aquatic Toxicity Rating, TLM 96: 1000 - 100 ppm

SECTION 8. SPECIAL PROTECTION INFORMATION

GOGGLES: Always wear protective eyeglasses or chemical safety goggles. Ethylene dichloride is particularly harmful to the eyes, and direct contact results in corneal opacity (permanent clouding of the eye). **GLOVES:** Wear impervious rubber gloves to prevent skin contact. **RESPIRATOR:** Use a NIOSH-approved respirator per the NIOSH *Pocket Guide to Chemical Hazards* (Genium ref. 88) for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow the respirator guidelines in 29 CFR 1910.134. Any detectable concentration of ethylene dichloride requires an SCBA, full facepiece, and pressure-demand/positive-pressure modes. Warning: Air-purifying respirators will not protect workers from oxygen-deficient atmospheres. **OTHER:** Wear rubber boots, aprons, and other protective clothing suitable for use conditions to prevent skin contact. Remove contaminated clothing and launder it before wearing it again. Discard contaminated shoes. **VENTILATION:** Provide maximum explosion-proof local fume exhaust ventilation systems to maintain the airborne concentrations of ethylene dichloride vapors below the exposure limits cited in section 2. Install properly designed hoods that maintain a minimum face velocity of 100 fpm (linear feet per minute). **SAFETY STATIONS:** Make eyewash stations, washing facilities, and safety showers available in areas of use and handling. **SPECIAL CONSIDERATIONS:** Vapors are heavier than air and will collect in low-lying areas. Eliminate sources of ignition in these areas and again provide good ventilation there. **COMMENTS:** Practice good personal hygiene. Keep materials off of your clothes and equipment. Avoid transferring this material from hands to mouth while eating, drinking, or smoking. Immediately remove ethylene dichloride-saturated clothing to avoid flammability and health hazards. Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Store ethylene dichloride in tightly closed containers in a cool, dry, well-ventilated area away from sources of ignition. Protect containers from physical damage and from exposure to excessive heat. Avoid direct physical contact with strong acids, bases, oxidizing agents, and reducing agents. **SPECIAL HANDLING/STORAGE:** Use nonsparking tools. Outside or detached storage is preferred. Store and handle ethylene dichloride in accordance with the regulations concerning OSHA class IB flammable liquids. **ENGINEERING CONTROLS:** During transfer operations involving ethylene dichloride, the liquid and its vapors must not be exposed to nearby sources of ignition from engineering systems that are not explosion proof. Preplan emergency response procedures.

TRANSPORTATION DATA (per 49 CFR 172.101-2):

DOT Hazard Class: Flammable Liquid

DOT Label: Flammable Liquid

IMO Class: 3.2

DOT Shipping Name: Ethylene Dichloride

DOT ID No. UN 1184

IMO Label: Flammable Liquid, Poison

References: 1-9, 12, 19, 21, 26, 43, 47, 73, 87-102. CK

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Approvals: *JO. Accorcello*

Indust. Hygiene/Safety *DW*

Medical Review *Lee/H. Schmidt*

11-18-87

11-30-87

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MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION

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MSDS # N 5

CHROMIC ACID, SOLID
Revision B

Issued:

Revised: August 1985

From Genium's MSDS Collection, to be used as a reference.

SECTION 1. MATERIAL IDENTIFICATION

17

MATERIAL NAME: CHROMIC ACID, SOLID

Other designations: Chromium Trioxide, Chromic Anhydride, Chromium (VI) Oxide,
 CrO_3 , CAS #1333-82-0

Manufacturer: Available from many sources, including: American Chlorine and Chemicals, Inc.

PO Box 9912

Buddy Lawrence Dr.

(512)883-3202

Corpus Christi, TX 78469



SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

Chromium Trioxide, CrO_3

ca 100

8hr TWA:
0.05 mg/m³ as Cr

*Current (1985-1986) ACGIH TLV for water-soluble chromium VI compounds

Ceiling limit:
0.1 mg/m³

**Current CSHA PEL (ceiling limit) from chromic acid and chromates

Dog, subcutaneous:
LDLo: 330 mg/kg

NOTE: the NIOSH-recommended exposure limit for Chromium VI Oxide is 0.025 mg Cr(VI)/m³ average over a work shift of up to 10 hours, with ceiling level of 0.05 mg Cr(VI)/m³ (15 minute period)

SECTION 3. PHYSICAL DATA

Melting point 197°C

Solubility in water, gm/100cc @ 20°C

Boiling point decomposes @ 250°C
to $\text{Cr}_2\text{O}_3 + \text{O}_2$

..... 63
Molecular weight 99.99

Specific gravity 2.7

Appearance and odor: dark red flakes or crystals which are deliquescent. No odor.

SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

Not combustible

NA

NA

Chromic anhydride is not flammable but is a strong oxidizing agent and can ignite many hydrocarbons, such as acetic acid and alcohol, when brought into direct contact. Certain inorganic chemicals will produce incandescence when mixed with chromic anhydride; i.e. arsenic, ammonia gas, hydrogen sulfide, phosphorus, potassium, sodium and selenium. Flammable materials near these reactions could be easily ignited.

Firefighters should wear self-contained breathing apparatus and full protective gear to prevent contact when fighting fires involving this material.

SECTION 5. REACTIVITY DATA

This material is stable when properly stored and handled. It is a strong oxidizing agent and will react with many oxidizable substances such as oils, grease, paper and plastics. The reactions can be rapid enough to ignite these materials. Chromic anhydride will ignite many hydrocarbons from direct contact. Incandescence is also produced from contact with the inorganics mentioned in Section 4.

SECTION 6. HEALTH HAZARD INFORMATION

TLV See Section 2

Inhalation of dust or mist can cause irritation of the respiratory tract due to high acidity and tissue oxidation. Ulceration of mucous membranes of the nose and mouth can result from inhalation. Skin contact with acid solutions or the solid may cause irritation. However, the major damage occurs up to 48 hrs. after contact. The chromates slowly dissolve the skin, forming ulcers. Secondary infections can then occur on the broken skin. Chromic acid is also a sensitizer and may cause allergic skin rash. Eye contact may result in severe burns with loss of vision. Ingestion may cause severe burns of the intestinal tract with internal damage. Ingestion of 5 grams or less may be lethal for an adult. Long-term absorption may cause liver damage. Increased instances of respiratory cancers have been reported in the chromate-producing industry. In its 1975 criteria document, NIOSH identified chromium trioxide as a "noncarcinogenic chromium IV." The IARC has classified "chromium and certain chromium compounds" as being carcinogenic to humans. The specific chromium compounds responsible for the carcinogenic effects are not identified.

FIRST AID: INHALATION: Remove person to fresh air. If necessary, aid breathing and seek medical attention*. **EYE CONTACT:** Immediately flush eyes, including under the eyelids, with running water for at least 15 minutes. Obtain medical assistance promptly*. **SKIN CONTACT:** Promptly remove contaminated clothing and wash infected area with soap and water. Seek medical attention* if irritation persists or other symptoms develop. **INGESTION:** Give person large quantities of milk or water to drink. Then induce vomiting. Get prompt medical attention*. (Never induce vomiting or give anything by mouth to an unconscious person.)

* GET MEDICAL ASSISTANCE = Implant, Paramedic, Community.

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety/environmental personnel of spills. Clean-up personnel should wear respirators and protective gloves and clothing to prevent inhalation and skin contact. Provide adequate ventilation. Spread a reducing agent, such as sodium sulfite or ferrous sulfate, on liquid acid spills. Scoop up the resulting slurry into a container of water and neutralize with soda ash. Solid spills may be carefully scooped into containers taking care to minimize dust generation.

Disposal: Solutions containing this material should be chemically treated with reducing agents and pH-adjusted to precipitate chromium. The precipitate and other solids containing this material should be disposed of in an approved chemical waste landfill. Follow applicable local, state, and federal regulations.

EPA Hazardous Waste Number: D007 (EP Toxicity--40 CFR Part 261)

Reportable Spill Quantity: 1000 lbs. (454 kg)

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. NIOSH-approved high-efficiency dust/mist respirators with full facepiece should be used during non-routine/emergency operations and whenever the TLV may be exceeded. Self-contained breathing apparatus or supplied air respirators (both in positive pressure mode) should be worn under severe exposure conditions (75 mg/m^3). Tanks of chromic acid must be adequately exhausted, with chemically resistant duct work and fans. Employees should wear chemical safety goggles to prevent eye contact. Faceshields should also be worn where splashing can occur. Neoprene or other synthetic rubber gloves and apron or protective clothing should be worn (caution: chromic acid may attack some of these materials). If clothing becomes contaminated, fresh clothing should be obtained immediately. Launder contaminated clothing before reuse. Eyewash stations and safety showers should be readily accessible in areas of use.

Contact lenses pose a special hazard: soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers away from oxidizable materials and other incompatible materials. Protect containers from physical damage. Maintain good housekeeping procedures. Avoid breathing dusts and mists. Avoid skin contact. Follow good personal hygiene practices. Wash hands thoroughly before eating and smoking. Wash all areas of the body which may have come in contact with this material at the end of each workday. Eating and smoking should not be permitted in areas where this material is handled.

DOT CLASSIFICATION: Oxidizer
DOT ID NO.: NA 1463

LABEL: Oxidizer, solid

DATA SOURCE(S) CODE (See Glossary) 2, 4, 9, 12, 19, 20, 27, 58, 60, 61, V.

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APPROVALS

Do Approved 11/85

INDUST. HYGIENE/SAFETY

SN 1-86

MEDICAL REVIEW:

[Signature] 86

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
P.O. BOX 1438, SCHENECTADY, NY 12301 USA
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No. 38

LEAD MONOXIDE
REVISION A

Date November 1979

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: LEAD MONOXIDE

OTHER DESIGNATIONS: Lead (II) Oxide, Plumbous Oxide, PbO, Litharge, Massicot, CAS # 001 317 368, GE Material DAC29; EAGLE #20 (Eagle-Picher), PtX (NL)

MANUFACTURER: Material is available from several suppliers, including:

Eagle-Picher Industries, Inc.
580 Walnut Street
Cincinnati, OH 45202

NL Industries, Inc.
P.O. Box 700
Hightstown, N.J. 08520

SECTION II. INGREDIENTS AND HAZARDS

Lead Monoxide

>99

HAZARD DATA

8-hr TWA 0.05 mg/m³*
(as Pb)

*Current OSHA PEL (Permissible Exposure Limit) continues at 8-hr TWA of 0.2 mg/m³; however, beginning 2/24/80, PEL is 0.05 mg/m³ with an action level of 0.03 mg/m³. (Certain industrial lead uses have an extended time for compliance; see Supplement sheet.) Blood sampling and analysis must be available to every worker exposed above the action level over 30 days/year. Temporary removal from lead exposure is required for workers with high blood lead levels (see Supplement sheet).

Rat; intraperitoneal
LDLo 430 mg/kg

SECTION III. PHYSICAL DATA

	<u>Litharge (PbO)</u>	<u>Massicot (PbO)</u>
Specific gravity (H ₂ O=1) -----	9.53	8.0
Melting point, deg C -----	888	-
Water solubility, g/100 cc -----	0.0017 at 20 C	0.0023 at 22 C
Crystalline form -----	Tetragonal	Orthorhombic
Color when pure -----	Yellow*	Yellow

*Commercial powdered material varies from yellow to reddish depending on treatment and levels of impurity (such as Pb₃O₄, Pb₂O₃, and Pb).

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	LOWER	UPPER
N/A				

Extinguishing Media: This is a non-flammable material; use extinguishing media which are appropriate to the surrounding fire.

Lead oxide can be an oxidizing agent for combustible materials when hot.

Inhalation of lead-containing dust is hazardous; firefighters need self-contained breathing apparatus when this material is involved in a fire situation.

SECTION V. REACTIVITY DATA

This material is stable for storage at room temperature as pure material in sealed containers. When heated and cooled in air, it can undergo transitions between crystalline forms (such as litharge and massicot) and interchange between certain oxide forms (such as Pb₂O₃, Pb₃O₄, and PbO).

Some incompatibilities: Chlorinated rubber plus PbO can react violently if heated. Litharge and glycerol mixture (a well-known cement) can burn in fluorine and explode by impact after contact with perchloric acid fumes. PbO powder can explode when mixed with finely divided aluminum or zirconium. Reaction can be vigorous with sodium, boron, silicon, titanium, metal acetylides, and other materials.

SECTION VI. HEALTH HAZARD INFORMATION	TLV 0.05 mg/m ³ (See Sect. II)			
<p>Ingestion and inhalation of PbO dust are the main sources of toxic hazard. Lead is a cumulative poison. Over a period of time a very small rate of intake can reach a toxic level. Excessive lead levels in the blood (see Supplement) require removal from exposure to lead. A level of 0.1 mg Pb/liter of urine is generally exceeded in lead poisoning cases. Lead poisoning can produce symptoms such as headache, nausea, cramps, dizziness, weakness, insomnia, diarrhea, and loss of appetite. Heavy acute exposure can result in stupor, coma, and death.</p> <p>FIRST AID: Remove from exposure!</p> <p>Workers with excessive exposure, who experience the symptoms of lead poisoning, should receive medical care and guidance promptly. Detailed biological specimen testing and evaluation of possible exposure conditions are required to diagnose lead poisoning. Hospitalization and chelate therapy and/or restriction from exposure to lead may be required.</p> <p>Eye and Skin Contact: Flush with plenty of running water to remove dust; get medical help if irritation persists. Wash all exposed skin well with soap and water.</p> <p>Inhalation: Remove from exposure. Get medical help.</p> <p>Ingestion: Contact physician promptly. Gastric lavage may be required.</p>				
SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES				
<p>Carefully vacuum up spilled material for recovery or disposal, avoiding dusting conditions, at all stages of handling, and place in a plastic bag-lined, tightly closed container. (Damp or wet clean-up methods may be useful in suppressing dust and can be used where more effective than vacuuming.)</p> <p>DISPOSAL: Follow Federal, State, and local regulations in disposing of waste material. Depositing it in an approved landfill should be evaluated as a suitable means of disposal. (Filtration of all exhaust ventilation air may be required, with filtrate disposal added to the waste problem.)</p>				
SECTION VIII. SPECIAL PROTECTION INFORMATION				
<p>Provide local exhaust ventilation with capture filtration to meet TLV requirements. Isolate PbO use area. Monitor lead exposure. An approved air purifying or self-contained respirator needed if dust conditions are not adequately controlled by ventilation (4.4 hr/day max. for negative pressure respirator use). Use appropriate design and housekeeping practices to prevent uncontrolled accumulation of dust deposits in exhaust ventilation systems or storage areas. Use engineering controls as the primary means for protection against lead exposure. Also provide clothing and equipment.</p> <p>Use safety goggles to prevent Pb oxide dust particles from entering the eyes.</p> <p>Provide clean, body-covering work clothing weekly to workers exposed above PEL (daily if exposed 0.2 mg/m³) and arrange for special handling and laundering of clothing contaminated with lead oxide dust. Use separate locker for work clothing, and shower after work before changing into street clothing. Prevent PbO from being carried home or transported to lunch room, rest rooms or other plant areas in workers' hair or clothing!</p>				
SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS				
<p>Store in tightly closed containers in a clean area away from combustible materials. Protect containers from damage. Keep away from food or feed. Prevent dust dispersing conditions and breathing of dust. Follow good housekeeping practice and good hygiene practice. Wash thoroughly before eating or smoking after handling this material or working in its areas of use or storage. Do not allow eating, drinking or tobacco use in areas of storage or use of PbO.</p> <p>Provide annual worker training. For exposures above 8-hr TWA of 0.03 mg/m³ provide work-place monitoring, and at least annual medical surveillance, semi-annual blood testing, and recordkeeping. Excessive lead exposure may adversely affect human reproductive functions.</p>				
DATA SOURCE(S) CODE: 2-10,12,20,24-26	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"> APPROVALS: MIS, CRD <i>J. M. Miller</i> </td> </tr> <tr> <td style="padding: 2px;"> Industrial Hygiene and Safety </td> </tr> <tr> <td style="padding: 2px;"> MEDICAL REVIEW: 12/79 </td> </tr> </table>	APPROVALS: MIS, CRD <i>J. M. Miller</i>	Industrial Hygiene and Safety	MEDICAL REVIEW: 12/79
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Industrial Hygiene and Safety				
MEDICAL REVIEW: 12/79				
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Material Safety Data Sheet

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GENIUM PUBLISHING CORP.

No. 311

METHYL CHLOROFORM
(Revision E)
Issued: November 1975
Revised: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: METHYL CHLOROFORM

Description (Origin/Uses): Used in cold-type metal cleaning; also in cleaning plastic molds.

Other Designations: 1,1,1-Trichloroethane; CH_2Cl_2 ; CAS No. 0071-55-6

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS

H 2

R 1

F 0

I -

R 1

S 2

PPG*

*See sect. 8 K 1



SECTION 2. INGREDIENTS AND HAZARDS/EXPOSURE LIMITS

Methyl Chloroform, CAS No. 0071-55-6

OSHA PELs

8-Hr TWA: 350 ppm, 1900 mg/m³

STEL: 450 ppm, 2450 mg/m³

ACGIH TLVs, 1988-89

TLV-TWA: 350 ppm, 1900 mg/m³

TLV-STEL: 450 ppm, 2450 mg/m³

Toxicity Data**

Man, Inhalation, LC_{50} : 27 g/m³ (10 Mins)

Man, Inhalation, TC_{50} : 350 ppm

Human, Oral, TD_{50} : 670 mg/kg

Rat, Oral, LD_{50} : 10300 mg/kg

*Contact your supplier for specifications, including details about inhibitors that can be added to the methyl chloroform product.

**See NIOSH, *RTECS* (KJ2975000), for additional data with references to irritative, reproductive, and mutagenic effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 165°F (74.1°C)

Melting Point: -26.5°F (-32.5°C)

Vapor Density (Air = 1): 4.55

Vapor Pressure: 100 Torrs at 68°F (20°C)

Molecular Weight: 133 Grams/Mole

Solubility in Water (%): Insoluble

Specific Gravity ($\text{H}_2\text{O} = 1$): 1.3376 at 68°F (20°C)

% Volatile by Volume: Ca 100

Appearance and Odor: A colorless liquid; mild, sweetish, pleasant, etherlike odor that may be just perceptible (if unfatigued) at about 100 ppm in the air.

Comments: Small variations in the above-noted physical properties are expected because of the various inhibitors that may be included in the methyl chloroform product.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point: None Found

Autoignition Temperature: 998°F (537°C)

LEL: 8.0% v/v

UEL: 10.5% v/v

Extinguishing Media: Methyl chloroform does not burn at ordinary temperatures. High-energy sources such as an electric arc or an elevated temperature are required for ignition of this material. When the source of ignition is removed, methyl chloroform tends to stop burning. Use water spray to cool fire-exposed containers. Use water fog, carbon dioxide, dry chemical, or foam to fight fires involving this material or nearby fires. **Unusual Fire or Explosion Hazards:** Methyl chloroform vapor is heavier than air and may travel a considerable distance to a low-lying high-energy source of ignition and flash back to its origin. Use care in selecting equipment (see sect. 5, Comments). **Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Methyl chloroform is stable in closed containers during routine operations. Hazardous polymerization cannot occur. **Chemical Incompatibilities:** Methyl chloroform can react dangerously with acetone, nitrogen tetroxide, oxygen (gas or liquid), sodium, sodium hydroxide, and sodium-potassium alloys. **Conditions to Avoid:** Avoid exposure to any high-energy source of ignition or to incompatible chemicals. **Hazardous Products of Decomposition:** Toxic and corrosive gases such as hydrogen chloride, dichloroacetylene, chlorine, and phosgene can be produced by decomposition of methyl chloroform at high temperatures, contact with hot metals, or exposure to ultraviolet radiation. Phosgene is usually produced in very small quantities; however, the significant irritating properties of hydrogen chloride (the dominant product of decomposition) prevent significant exposure to the phosgene. **Comments:** This material can be hydrolyzed by water to form hydrochloric acid and acetic acid. It will react with strong caustics to form flammable or explosive materials. It attacks natural rubber. Methyl chloroform requires an inhibitor content to prevent corrosion of metals. When the inhibitor is depleted, this material can decompose rapidly by reaction with finely divided white metals such as aluminum, magnesium, or zinc. Do not use these metals in pressurized spraying equipment where methyl chloroform is involved.

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: Methyl chloroform is not listed as a carcinogen by the NTP, IARC, or OSHA.

Summary of Risks: Methyl chloroform exhibits low oral toxicity. It can defat the exposed skin of workers and cause redness and scaling. Although methyl chloroform is low in systemic toxicity, it is an anesthetic that is capable of causing death if it is inhaled at concentrations of 14000 to 15000 ppm. Fatalities that have occurred in poorly ventilated areas such as pits or tanks are attributed to anesthesia and/or sensitization of the myocardium to epinephrine. Quick and complete recovery is reported upon prompt removal of unconscious exposed persons from the area of exposure. The TLV-TWA cited in section 2 is set to prevent initial anesthetic effects and/or objections to the

SECTION 6. HEALTH HAZARD INFORMATION, cont.

odor. Medical Conditions Aggravated by Long-Term Exposure: None reported. Target Organs: Skin, eyes, heart, cardiovascular system, and CNS. Primary Entry: Inhalation, skin absorption. Acute Effects: Headache, lassitude, dermatitis, skin and eye irritation, cardiac arrhythmias, and depression of the CNS. Chronic Effects: None reported. **FIRST AID:** Eyes. Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 minutes. Skin. Rinse the affected area with flooding amounts of water, then wash it with soap and water. Inhalation. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. Ingestion. Unlikely. Should this type of exposure occur, medical help is not readily available, and the amount swallowed was appreciable, give the exposed person milk of magnesia to drink and induce vomiting. Repeat this procedure. Aspiration hazards exist, so the decision whether or not to induce vomiting must be made carefully. If vomiting is to be induced, carry it out as quickly as possible before the ingested methyl chloroform is internally absorbed. This procedure would increase the chance of aspiration. **Get medical help (in plant, paramedic, community) for all exposures.** Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** The estimated lethal dose by ingestion for a man weighing 150 pounds is 0.5 to 1 pint. Do not use adrenalin or sympathomimetic amines in treatment because of the increased cardiac sensitivity involved. Ingestion may cause spontaneous vomiting.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, evacuate unnecessary personnel, eliminate all sources of ignition immediately, and provide adequate explosion-proof ventilation. Cleanup personnel need protection against skin or eye contact with this liquid as well as inhalation of its vapor (see sect. 8). Contain large spills and collect or absorb waste with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place liquid or absorbent waste into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways. **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U226

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Resource Conservation and Recovery Act, § 3001.

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Use a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent prolonged or repeated skin contact with this material. Suggested materials include neoprene, polyvinyl alcohol, or polyethylene. Natural rubber is not recommended. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. **Other:** Exercise care in the selection of safety and handling equipment because methyl chloroform attacks natural rubber. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale methyl chloroform vapor. Consider functions of the CVS, CNS, liver, and skin while administering preplacement and periodic medical exams.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store methyl chloroform in closed containers in a cool, dry, well-ventilated area away from sources of ignition and incompatible chemicals (see sect. 5). Protect containers from physical damage. Steel is a recommended material for storage containers.

Special Handling/Storage: Prevent moisture contamination of storage facilities. Monitor levels of inhibitor. Use caution in cleaning operations involving white metal fines (see sect. 5). **Engineering Controls:** Make sure all engineering systems (production, transportation) are of maximum, explosion-proof design. Electrically ground and bond all containers and pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations to prevent generating static sparks. **Other:** Personnel who regularly work with methyl chloroform should avoid drinking alcoholic beverages shortly before, during, or after exposure.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: 1,1,1-Trichloroethane

DOT Hazard Class: ORM-A

ID No. UN2831

DOT Packaging Requirements: 49 CFR 173.605

DOT Packaging Exceptions: 49 CFR 173.605

IMO Shipping Name: 1,1,1-Trichloromethane

IMO Hazard Class: 6.1

IMO Label: Saint Andrew's Cross (X)*

IMDG Packaging Group: III

*Harmful-Stow away from Foodstuffs (Materials of Class 6.1 Packaging Group III).

References: 1, 38, 84-94, 116, 117, 120, 122.

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Medical Review: MJ Hardies, MD

Material Safety Data Sheet

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No. 313

PERCHLOROETHYLENE
(Revision D)
Issued: November 1978
Revised: August 1988

SECTION 1. MATERIAL IDENTIFICATION

Material Name: PERCHLOROETHYLENE

Description (Origin/Uses): Used in commercial dry cleaning and metal-degreasing operations; used to a lesser extent in home products and in veterinary anthelmintics (worming).

Other Designations: Ethylene Tetrachloride; Tetrachloroethylene; C_2Cl_4 ; CAS No. 0127-18-4

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS

H 1

F 0

R 1

PPG*

*See sect. 8

NFPA

R 1

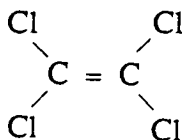
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SECTION 2. INGREDIENTS AND HAZARDS

Perchloroethylene, CAS No. 0127-18-4



*See NIOSH, *RTECS* (No. KX3850000), for additional data with references to reproductive, irritative, tumorigenic, and mutagenic effects.

%
Ca 100

EXPOSURE LIMITS

OSHA PEL

8-Hr TWA: 100 ppm

Ceiling: 200 ppm

Maximum Peak above the Ceiling: 300 ppm
for 5 min. in any 3 Hrs

ACGIH TLVs, 1987-88

TLV-TWA: 50 ppm, 340 mg/m³

TLV-STEL: 200 ppm, 1340 mg/m³

Toxicity Data*

Human, Inhalation, TC_{L_0} : 96 ppm/7 Hrs

SECTION 3. PHYSICAL DATA

Boiling Point: 250°F (121°C)

Specific Gravity ($H_2O = 1$): 1.623

% Volatile by Volume: 100

Water Solubility (%): Insoluble

Molecular Weight: 166 Grams/Mole

Vapor Pressure: 19 Torrs at 77°F (25°C)

Vapor Density (Air = 1): 5.83

Appearance and Odor: A clear, colorless liquid; ethereal odor.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
*	*	% by Volume	*	*

Extinguishing Media: *Perchloroethylene does not burn. Use extinguishing agents that will put out the surrounding fire.

Unusual Fire or Explosion Hazards: Perchloroethylene vapor is heavier than air and it collects in low-lying areas such as sumps, wells, and underground piping systems. Enter these low-lying areas with appropriate caution.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode. Use care in selecting safety equipment (see sect. 5, Conditions to Avoid).

SECTION 5. REACTIVITY DATA

Perchloroethylene is stable in closed containers during routine operations. It does not undergo hazardous polymerization.

Chemical Incompatibilities: Hazardous chemical reactions involving perchloroethylene and barium, beryllium, or lithium are reported in Genium reference 84, page 491M-208.

Conditions to Avoid: Prevent contact with incompatible chemicals. Avoid exposure to direct sunlight. Monitor the stabilizer level in the perchloroethylene product; get specifications from your supplier for the proper inhibitor levels. This material forms hydrochloric acid (HCl) if the inhibitor level becomes too low. Do not mix perchloroethylene with caustic soda or potash. This material may degrade or attack rubber and some plastics and coatings, so select protective gear and handling equipment carefully.

Hazardous Products of Decomposition: Although perchloroethylene itself does not burn, it can be very hazardous in fires because of thermooxidative degradation at high temperatures to very toxic phosgene and corrosive hydrogen chloride. Electric arcs and perchloroethylene vapor may also produce these products of hazardous decomposition.

SECTION 6. HEALTH HAZARD INFORMATION

Perchloroethylene is not listed as a carcinogen by the NTP, IARC, or OSHA.

Summary of Risks: Perchloroethylene affects the central nervous system (CNS), causing incoordination, headache, vertigo, light narcosis, dizziness, unconsciousness, and even death. All of these can occur as the level and duration of exposure continues.

Medical Conditions Aggravated by Long-Term Exposure: None reported. **Target Organs:** CNS, eyes, skin.
Primary Entry: Inhalation, skin. **Acute Effects:** Irritation of the skin, eyes, and upper respiratory tract (URT); CNS effects.
Chronic Effects: None reported.

FIRST AID

Eyes: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes.
Skin: Immediately wash the affected area with soap and water.
Inhalation: Remove the exposed person to fresh air; restore and/or support his or her breathing as needed.
Ingestion: Never give anything by mouth to someone who is unconscious or convulsing. Do not induce vomiting.

GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, provide ventilation, and eliminate all sources of ignition immediately. Cleanup personnel need protection against contact with and inhalation of vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways. **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Air Contaminant (29 CFR 1910.1000 Subpart Z)

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U210

CERCLA Hazardous Substance, Reportable Quantity: 1 lb (0.454 kg), per Clean Water Act (CWA), section 307 (a) and Resource Conservation and Recovery Act (RCRA), section 3001

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of perchloroethylene solution may occur, wear a full face shield/splash guard. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Consult the *NIOSH Pocket Guide to Chemical Hazards* for general recommendations on respirator protection. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine use (e.g., cleaning reactor vessels or storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent prolonged or repeated skin contact with perchloroethylene. Suggested material includes polyvinyl alcohol, polyethylene, or neoprene. Leather shoes are also appropriate. **Ventilation:** Install and operate general and local ventilation systems that are powerful enough to maintain airborne levels of perchloroethylene dust below the OSHA PEL standard cited in section 2. **Safety Stations:** Make eyewash stations, washing facilities, and safety showers available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Avoid inhaling perchloroethylene vapor. Select safety equipment carefully (see sect. 5, Conditions to Avoid).

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store perchloroethylene in a cool, dry, well-ventilated area away from barium, beryllium, and lithium.

Special Handling/Storage: Protect containers from physical damage. Fit all holding tanks with an air-drying venting system that prevents moist air from entering the tank and allows for perchloroethylene vapor expansion and contraction; airtight storage facilities are not recommended. Aluminum is not recommended for storage facilities.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Tetrachloroethylene

DOT Label: None

IMO Label: Saint Andrew's Cross (X)*

DOT ID No. UN1897

DOT Hazard Class: ORM-A

IMO Class: 6.1

*Harmful-Stow away from Foodstuffs (Materials of IMO Class 6.1, Packaging Group III).

References: 1, 12, 73, 84-94, 100, 103.

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MATERIAL SAFETY DATA SHEET

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NO. 15A

CHRYSOTILE ASBESTOS

Date November 1979

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: CHRYSOTILE ASBESTOS

DESCRIPTION: A crystalline serpentine mineral, or layered, hydrated magnesium silicate in fine fiber form (asbestiform). The end of a silver of this material with a cross-section of 0.1 mm² can show about 20 million tubules (scroll-like fibrils about 0.01 μm diameter) in approximate parallel orientation. It is possible to strip from a fiber bundle very fine chrysotile threads, each an agglomerate of hundreds or thousands of hollow fibrils. (90% of asbestos used is chrysotile.)

OTHER DESIGNATIONS: Asbestos, CAS #001 332 214, GE Material D4E11

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Idealized Chrysotile (unit cell) - $Mg_3Si_2O_5(OH)_4^*$	ca 95	8-hr TWA 2 fibers/cc,* Ceiling 10 fibers/cc (>5 μm in length) "Asbestos" Human, inhal. IDLo 1.2 fb/cc for 19 years (Pulmonary effects)
<p>*Impurities include low levels of Mn, Fe⁺², Fe⁺³, and Al in the structure, replacing randomly 4% av. of the Mg atoms. Impurities depend on the mineral source; the unit cell hydroxyl content can also vary with an average of 4.25.</p> <p>**Current OSHA TLV. OSHA (1975) proposed TLV of 0.5 fb/cc with a Ceiling of 5 fb/cc (15 min. sample). NIOSH (1976) proposed 0.1 fb/cc. ACCIH (1979 Intended Changes List) has retained TLV of 2 fb/cc for chrysotile asbestos. Asbestos is <u>carcinogenic</u> and/or <u>co-carcinogenic</u> for humans!</p>		

SECTION III. PHYSICAL DATA

Melting point ----- Decomposes (see Sect. V)
Vapor pressure ----- Nil
Water solubility ----- Insoluble (slowly breaks down in hot water)
Appearance: White, fibrous solid, as long flexible textile fibers down to dust-like filler power. [Milled chrysotile asbestos (powder-like) has an aspect ratio (ratio of length/diameter) as high as 50 for most particles.]

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
N/A	N/A	N/A		

This material is not combustible in air. Use extinguishing media as appropriate for the surrounding materials in a fire situation.

SECTION V. REACTIVITY DATA

This material is inert under ordinary room temperature and heated use conditions. It is resistant to heat, but it will decompose and alter its microscopic fiber structure (see Sect. I) above 600 C (1112 F): Chrysotile dehydroxylates at 600-780 C; the "asbestos anhydride" in turn breaks down to mixture of silica (SiO₂) and forsterite (Mg₂SiO₄) at 800-850 C. Above 1000 C (1832 F) magnesium pyroxenes are formed which melt at about 1450 C.
Strong acids can attack chrysotile and rapidly extract its MgO and H₂O content; it can be decomposed by glacial acetic acid. Hot water slowly breaks down chrysotile. It, like other forms of asbestos, resists strong alkali (5 M NaOH at least up to 100 C).

SECTION VI. HEALTH HAZARD INFORMATION	TLV 2 fibers/cc >5 μ m in length (See Sect. II)
<p>As a particulate material, chrysotile asbestos can be irritating to the respiratory tract, skin or eyes. However, the significant industrial hazards arise from excessive dust inhalation with damage requiring years to become evident. Chronic inhalation of high levels of asbestos particles can produce asbestosis, a disabling fibrosis of the lungs which gradually reduces lung capacity and efficiency. (Usually over 4 years is required for a serious condition to develop.) Excessive inhalation can also cause pleural plaque, a thickening of the lung lining. Compliance with TLV is expected to control these hazards. Cancer can result from excessive inhalation of asbestos particulate, which may require decades to develop. Lung cancer is a special risk to those who smoke cigarettes regularly in addition to having asbestos exposure. Rare mesotheliomas of the pleura and peritoneum (lining around the lungs or abdominal cavity) and possibly cancers of the GI tract and larynx (also smoking related) have been associated with inhalation exposure to asbestos particles. (Crocidolite asbestos has been suggested as the major mesothelioma risk.) In groups of workers exposed to asbestos, lung cancer death is 3 or 4 times more common than mesothelioma death, and 97.5% of asbestos-related lung cancers occur with those workers who also smoke cigarettes. For non-smokers asbestos exposure increases risk of lung cancer 5X.</p>	
<p>SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES</p> <p>Notify safety personnel of spills! Exclude all from spill area except trained clean-up personnel who have approved respiratory protection against dust. Provide exhaust ventilation with capture filtration, but do not stir up the dust. Use a wet method or an approved vacuum cleaning system to pick up spills. The techniques used must collect particulate without dispersing dust into the air. Waste must be placed in dust-tight containers or sealed plastic bags for disposal. Label properly!</p> <p>DISPOSAL: Deposit waste containers in a secured landfill where asbestos will remain buried. Follow Federal, State and local regulations. Also note that chrysotile can be converted into non-asbestos waste by heating at high temperature (see Sect. V).</p>	
<p>SECTION VIII. SPECIAL PROTECTION INFORMATION</p> <p>Provide exhaust ventilation and capture filtration to remove airborne asbestos particulate from the workplace (as much as possible) without dispersing it into the environment. Isolate work areas (also post signs) where asbestos particulate may occur at excessive levels.</p> <p>For nonroutine or emergency conditions where excessive dust is present, approved respirators must be used: Single use or re-usable air-purifying respiratory up to 10X TLV; full-facepiece powered air-purifying respirator up to 100X TLV; full-facepiece air-supplied (continuous flow or pressure-demand type) respirator above 100X TLV.</p> <p>Depending on exposure levels, it may be necessary to provide body-covering work clothes, special vacuuming facilities for clothes and suitable laundering or disposal arrangements, change areas with dual lockering facilities, showers before changing to street clothing after work, etc. Be sure workers do not carry asbestos dust home on their clothing or person. Prevent asbestos dust from being carried to rest rooms, to eating areas, to non-asbestos workplaces, etc.</p>	
<p>SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS</p> <p>Store asbestos in closed containers (dust tight) in a clean, secure area. Protect containers from physical damage. Do not open containers that can release asbestos dust without providing proper enclosure or control measures. Use dust suppression control measures at all stages of asbestos handling, use and disposal. Follow good housekeeping practices to prevent accumulations of asbestos-containing dust. Avoid inhalation of asbestos. The effects on cancer incidence of chronic exposure are not yet fully known. Monitor areas where asbestos dust is present to be sure of worker exposure levels; keep records to define exposures and retain for at least 20 years. Provide preplacement and annual medical examinations for those exposed in the workplace to 8-hr TWA of 0.1 asbestos fibers or more/cc which are >5 μm in length. Retain medical records for at least 20 years.</p>	
<p>DATA SOURCE(S) CODE: 2-4, 6, 12, 14, 20, 26, 32</p> <p>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranty, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</p>	<p>APPROVALS: MIS. <i>J. M. J.</i> CRD <i>J. M. J.</i></p> <p>Industrial Hygiene and Safety</p> <p>MEDICAL REVIEW: 12/79</p>